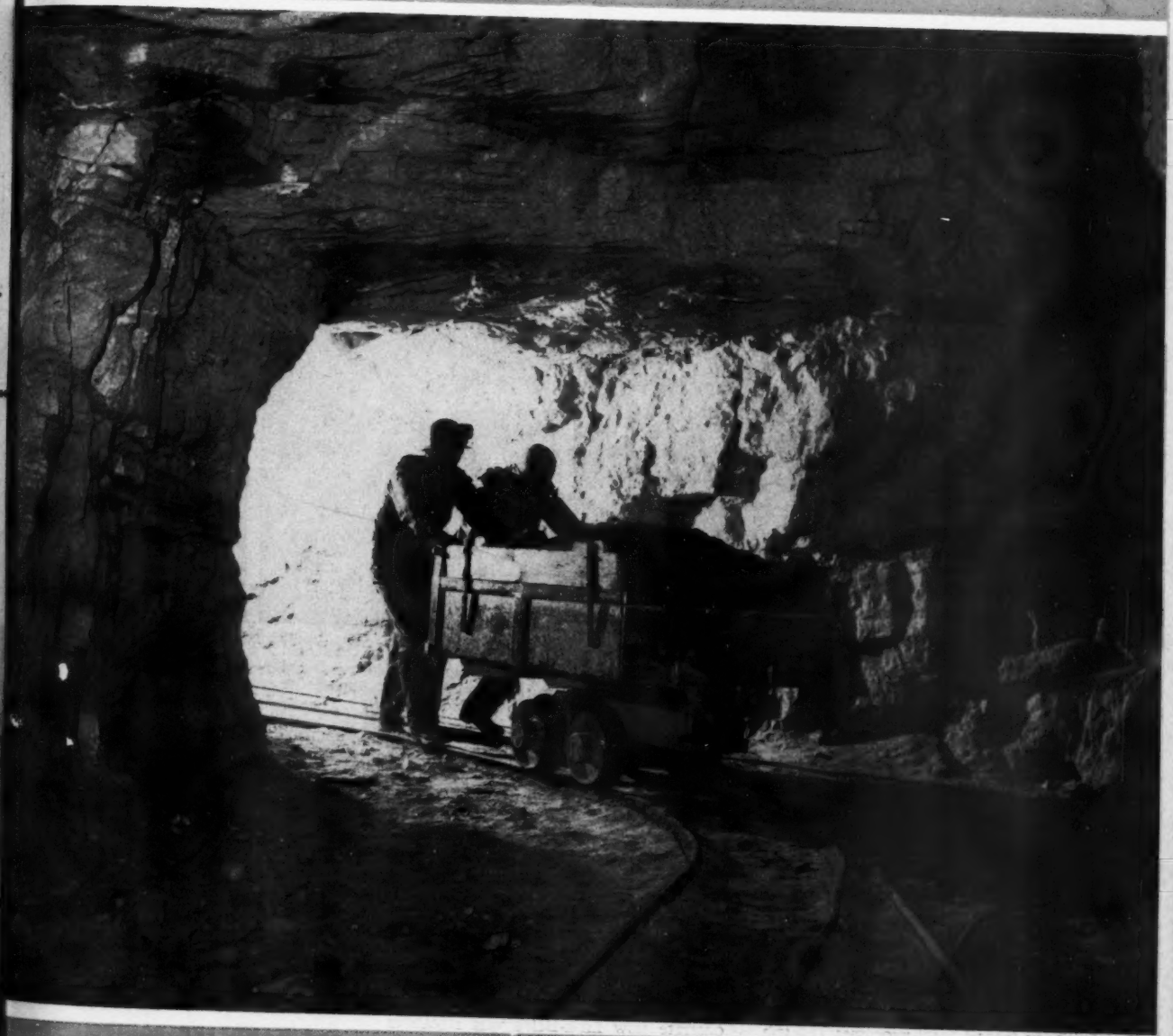
Mining CONGRESS JOURNAL

AMERICAN MINING CONGRESS

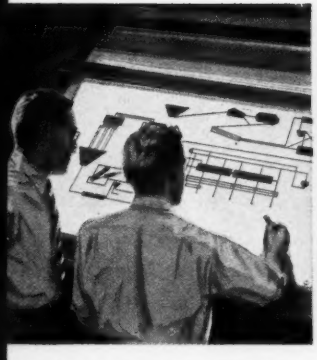
OCTOBER
1952



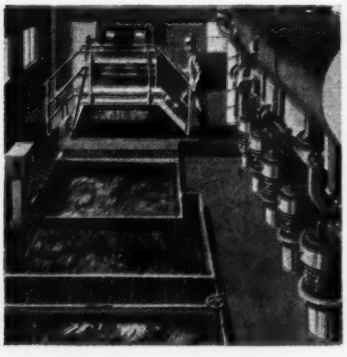
Report on AMC Denver Convention

The Inland Steel, Price, Ky., preparation plant built by Link-Belt provides low-cost mechanical ash removal.

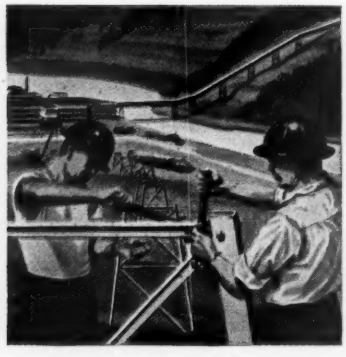
Here's what it means to you when LINK-BELT accepts total responsibility



VERALL ENGINEERING. Vast experi-nce of nation-wide design and eld engineering staff integrates ll factors, assures expert planning.



QUALITY EQUIPMENT. Link-Belt itself builds a broad line of coal preparation, handling and power transmitting equipment.



COMPLETE ERECTION. Experienced erection superintendents, staffs and skilled crews carry through entire job down to last detail.

SATISFACTORY PERFORMANCE. Wh you rely on Link-Belt as a sin source, Link-Belt accepts respon bility for overall operation.

Inland Steel reduces ash content of raw coal

WHEN Inland Steel wanted a new plant at Price, Ky., for the efficient preparation of metallurgical coal—they turned the job over to Link-Belt. From the modern buildings that house the equipment—to mine car dumping, coal cleaning, coal handling and refuse disposal machinery—it's Link-Belt all the way.

Today Inland Steel processes 750 tph of raw coal. Equally important, the new plant permits "full seam" mining. Extracting coal in areas formerly uneconomical steps up ton-per-man production permitting recovery of a larger per cent of the deposit.

Find out how you can utilize Link-Belt's total responsibility. On small jobs as well as large, an engineer in the Link-Belt office near you will be glad to demonstrate how Link-Belt's vast resources can serve you.

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Springs (South Africa).

LINK-BELT

13,028

COAL PREPARATION and HANDLING EQUIPMENT

Whaley "Automat" Now Available with Crawler Mounting for Off Track Loading

Shovel Action Loader Now Built Either Track Mounted or Crawler Mounted

THE CRAWLER MOUNTED Whaley "Automat" is shown here in operation under the strenuous loading conditions of iron ore. Note the clean floor left by the machine.

The shovel action Whaley "Automat" loading machine is now available for off track loading as well as track loading.

Myers-Whaley Co., Knoxville, Tenn., builders of the first successful underground loading machine, are now building the Whaley "Automat" on crawler mount for operation in mines where off track loading is most desirable.

The Whaley "Automat" Crawler Unit is a completely independent structure upon which the "Automat" loading machine is mounted. The loading machine above the crawler mounting is the same Whaley "Automat," either the No. 3 or the No. 3-LS, as the track mounted machine, but omitting the axles and track wheels, and with the main frame of the loading machine set down on and supported by the crawler frame.

All the advantages of the track machine are obtained in the crawler mounted "Automat," plus a very simple and efficient crawler mechanism.

The Crawler Mounted "Automat" has all the exclusive advantages of the track machine. 1—The exclusive, natural, automatic shovel action. 2—Safe loading with no sudden side kicking of rear conveyor. 3—The parallel lift rear conveyor which takes full advantage of limited head room. 4—A rated 7 ton per minute loading capacity with only one motor and it only 25 HP.

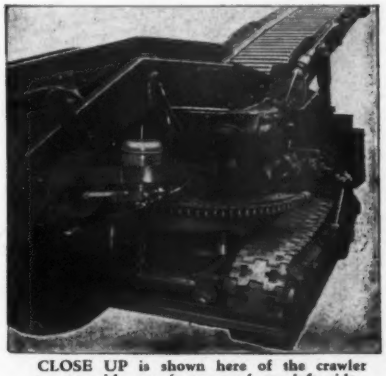
Basic mechanical features include: Two speed tramming. Power driven spooling reel for the trailing cable, and automatic lubrication.

The hydraulic control system for the crawler unit is separate from the main hydraulic system of the loading machine. Three additional valves in one bank are used for the crawler control.

An important advantage of the Whaley "Automat" on Crawler Mounting is that the use of the steering is greatly reduced as the machine will carry a width up to 24 feet from just one setting of the crawlers. This means that the machine is easy on the bottom.

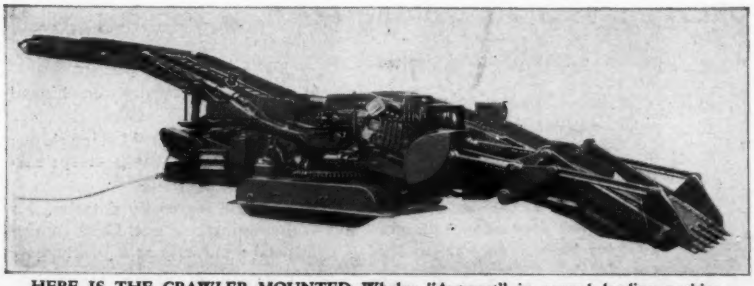
The loading capacity of the Crawler Mounted "Automat" is 280 cu. ft. per minute. It averages 120 cu. ft. per minute.

Complete information on the Whaley "Automat," track mounted and crawler mounted, coal and rock loaders may be obtained by writing Myers-Whaley Company.



CLOSE UP is shown here of the crawler mount with guards removed on left side.

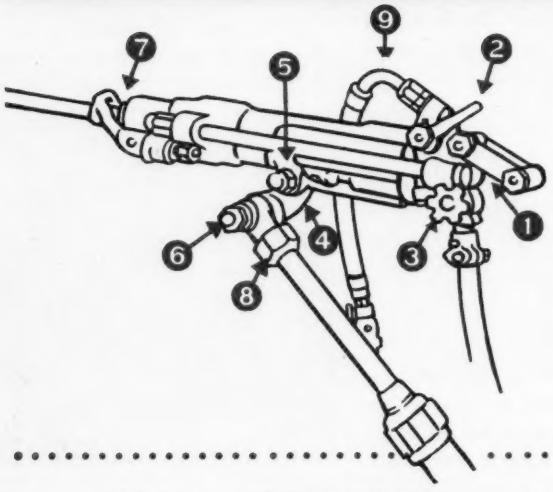
Folder No. 472 gives details and specifications on the Whaley "Automat" track mounted loaders. Folder No. 2015 gives the details and specifications on the Whaley "Automat" crawler mounted loaders.



HERE IS THE CRAWLER MOUNTED Whaley "Automat" in normal loading position. Note the adequate protection guards over crawlers. This is a right hand controlled machine. Left or right controls are optional, either on the Jib or Main Frame.

MYERS-WHALEY
KNOXVILLE, TENN.

ANOTHER BIG ADVANCE IN RO



Never before have you been offered a Jackleg drill that would do *so much—so easily*. That's because the JR-38 Jackdrill is not just an adaptation, but a completely integrated unit designed to meet your every requirement.

Since the throttle valve shuts off feed-leg air in the "off" position, the leg can be shortened or removed without even closing the feed-leg valve. Automatic air-water control avoids the need for separate adjustments. And the exclusive built-in air coupling between drill and feed leg does away with the third hose.

The JR-38 is supplied with 2′, 3′ and 4′ feed legs, and a full range of drill rotations. With a total weight of only 88 lbs. using the 3 foot feed, this is without question one of the lightest drilling units of its power ever developed.

Ask your Ingersoll-Rand representative to demonstrate the JR-38.

Here are the FEATURES you've been waiting for in a Jackleg Drill:

1. All controls grouped in fixed position on drill backhead.
2. Five-position throttle gives unified control of all operations, as follows:
   - Blowing Position – drill and air feed off
   - Off Position – drill and air feed off.
   - Feed Position—air feed on, drill off.
   - Collaring Position—automatic water and air feed on, limited air to drill.
   - Drilling Position—full air to drill and feed.
3. Feed leg control valve is built into the backhead.
4. Air connection through mounting support eliminates separate air hose to feed leg—air to leg goes through the drill.
5. Balance can be adjusted to suit operator by loosening and tightening one nut.
6. Adjustable tension on hinged joint.
7. Constant chuck blowing keeps hole free of cuttings—keeps cuttings out of drill.
8. Air feed leg easily detached by loosening one nut. Drill can be used separately as a Jackhamer.
9. Location of water connection improves balance – keeps hose out of the way.

N ROCK DRILL DESIGN!

it's Ingersoll-Rand's

UNIVERSAL JACKDRILL

Use it as a **STOPER**

. . . as a **DRIFTER**

. . . as a **JACKHAMER**

The JR-38 Jackdrill is excellent as a plugger or Jackhamer. It is easily detachable from the leg by loosening one nut and ready to use without any further adjustments.

IT'S A LIGHT-WEIGHT AIR-FEED DRILLING UNIT . . . designed for faster, easier operation in any position

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 814-5

SCOTIA COAL & COKE CO.
MOVED 1,440,000
TONS OF COAL

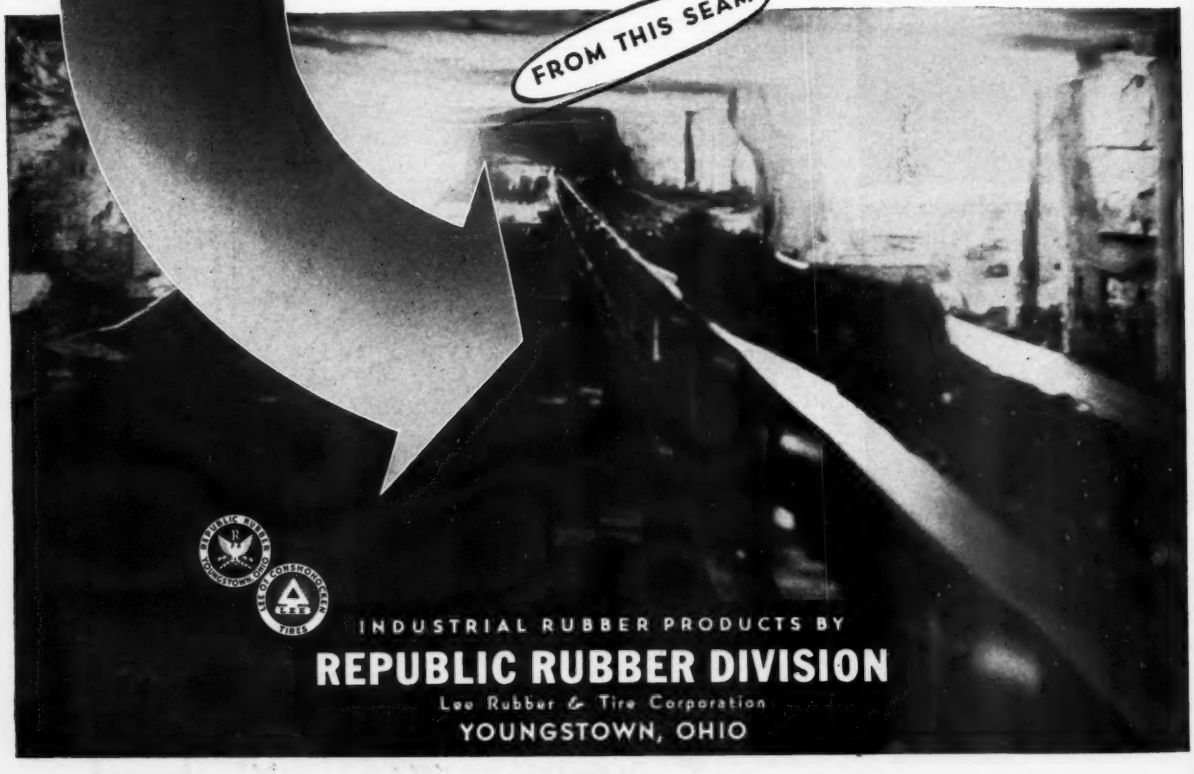
ON THIS BELT

NO MAJOR BREAKDOWNS!!

● This rugged, tough, Republic Record Maker coal handling belt has been on the move now for nearly six years helping the Scotia Coal & Coke Company cut costs in their #3 Rush Run Mine at Brooklyn, West Virginia. The belt, made with specially compounded, abrasion-resistant cover and shock-insulated, mildew-resistant inner plies, has proved its ability to stand up under constant flexing, severe buffeting, impact and all service stresses of mining operations. Republic Record Maker Conveyor Belting is available in both straight and step-ply construction through your local Republic Distributor.

Your Republic Distributor is an expert in the application and care of Industrial Rubber Products who carries a complete line of hose and belting, specially designed for coal field service. Contact him today or write direct for full facts.

FROM THIS SEAM



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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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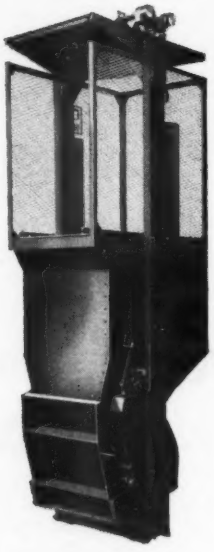
Reliable EQUIPMENT IS AS VITAL TO THE COAL INDUSTRY AS COAL ITSELF...

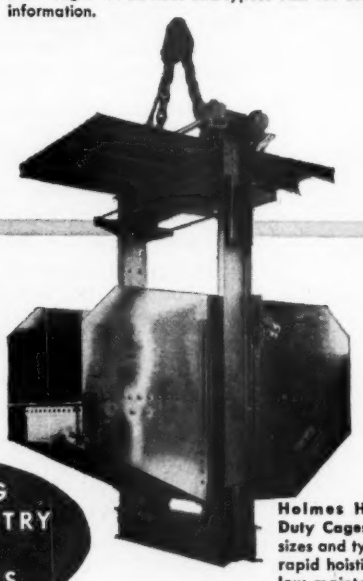
HOLMES MINING EQUIPMENT

The hundreds of mines using equipment engineered and built by Holmes, is a testimonial that they have been *doing one thing well* since 1872. Use this specialized experience to obtain the most advanced design, the best of materials and the latest methods of manufacture. Take advantage of this background of creative engineering and long-standing reputation for sturdy construction that assures efficient, dependable performance at lower over-all costs. Call a Holmes Mine Equipment engineer for consultation in the planning and development of your requirements. There is no obligation.

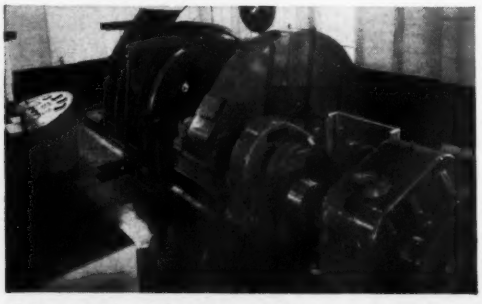
ROBERT HOLMES & BROS., INC.
DANVILLE, ILLINOIS



Holmes Combination Drop Bottom Mine Skip and Man Cages- in all sizes and types. Ask for complete information.



Holmes Heavy-Duty Cages in all sizes and types for rapid hoisting and low maintenance. Ask for complete information.

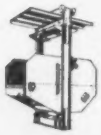


Advance Design Hoists feature the latest and most complete control equipment. Ask for complete information.

SERVING THE INDUSTRY FOR 80 YEARS

SHEAVES

TIPPLE EQUIPMENT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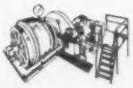
CAR PULLERS AND RETARDERS

LABORATORY CRUSHERS


HOISTS

VIBRATING SCREENS

DUSTOLATORS

Big lift for maintenance men...

● With its hundreds of belt idler bearings, this large coal conveyor at a midwest surface mine could have presented significant lubrication and maintenance problems. That's why mine officials, acting upon the suggestion of a Standard lubrication specialist, switched to STANOBAR Grease No. 2.

STANOBAR has dispensed easily from grease guns, thus providing a big lift for maintenance men. This has served to keep time and labor for applying lubricant at a minimum. There has been no trouble from hardening or caking of the grease in the bearings, nor has leakage been a problem. Effective lubrication has prevented any bearing failures due to excessive wear and has kept power requirements for starting and moving the conveyor belt at a minimum.

Operators of this mine have found STANOBAR entirely suited for bearing lubrication in other tipple equipment, such as shaker screens. This versatility has helped simplify lubrication from both stocking and application standpoints.

STANOBAR
TRADE MARK
Grease

The experience of this mine points to savings you can make through Standard's lubrication engineering service and high quality products. How you can get this lubrication service, quickly and easily, is explained at the right. Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

H. Dillingham, of Standard Oil's Evansville, Indiana, office, is the Standard lubrication specialist who worked with this mine to find the right grease for a tough job. As a result of his work, the mine was able to save time and expense for the maintenance of a coal conveyor.

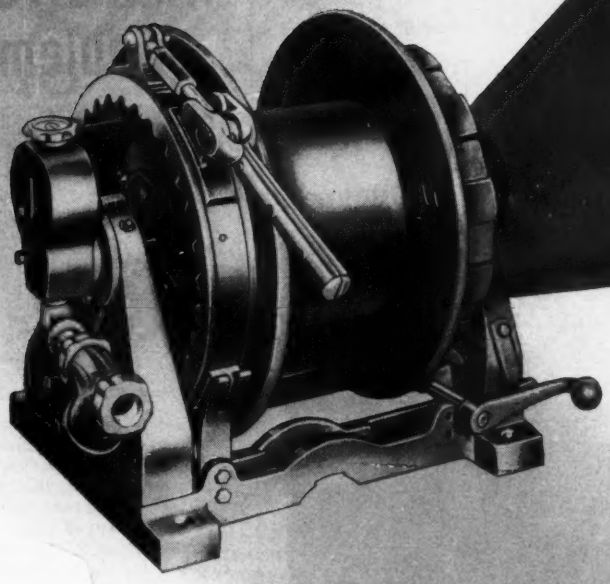
His on-the-job service is typical of that available to all midwest mines through a corps of such lubrication specialists. You can be sure that the specialist in your own area has both the practical experience and the training in a Standard Oil Lubrication Engineering School that will result in dependable, thorough assistance. To reach him, all you need do is phone your local Standard Oil Company Office. When he calls, be sure to discuss with him the benefits offered you by such products as:

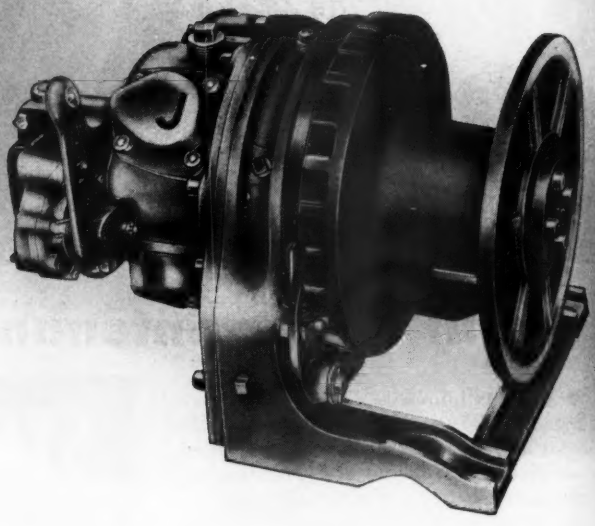
STANOIL Industrial Oils—Simplify your lubrication jobs by using this *one* line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems.

SUPERLA Mine Lubricants—These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANDARD OIL COMPANY **STANDARD** (*Indiana*)





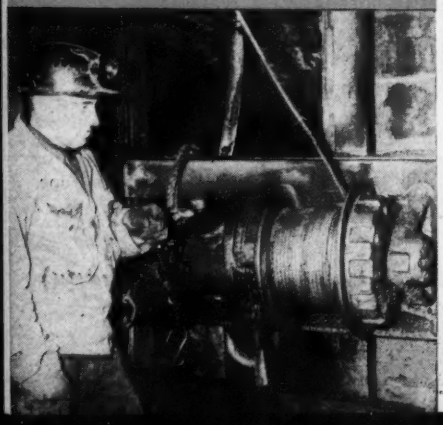
TOP: Model F-113 "Turbinair". Compact, simple design with motor *inside* the drum. Direct power transmission from motor to drum assures maximum efficiency. Simple, accessible controls make operation easy.

RIGHT: Model DW-111 "Pistonair". Features reversible power with light weight. Four-cylinder, 3½ h.p., reversible motor will handle up to 1200 lbs.

FAR RIGHT: Model L-111 "Pistonair". For heavy hoisting jobs. 7½ h.p., reversible, five-cylinder motor for loads up to 2000 lbs.

OVER 100 YEARS OF ENGINEERING LEADERSHIP

Joy L-111 reversible "Pistonair" Single Drum Hoist operating in a magnetite iron mine in the Adirondack region of New York.

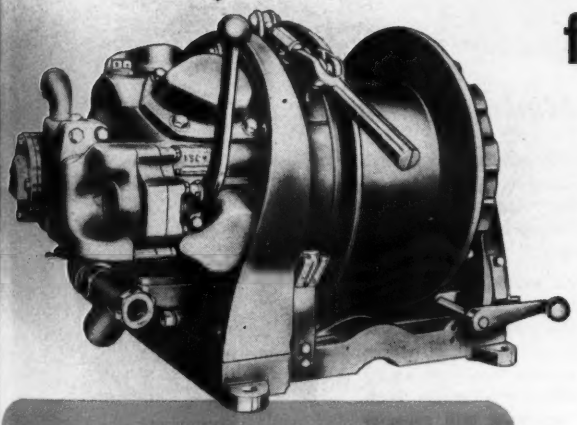


Joy E-112 "Turbinair" lifting timbers in a raise in a western mine. The extra rope capacity of the E-112 (450' of ⅜" rope) makes it applicable to *any* of the utility hoisting needs in this mine

Joy AW-80 Air Winch hoisting timbers into pla in a drift in a Canadian mine. At a weight of on 85 lbs., this unit will lift 500 *lbs!*

BETTER SERVICE from

JOY SINGLE DRUM HOISTS



They're real Mining Hoists—designed and built from long field experience expressly for underground use

Joy Single Drum Mining Hoists are compactly designed, of modern, high-strength alloy metals, for lighter weight with greater power and efficiency.

The complete Joy line includes the "Turbinair" series which develop maximum horsepower per unit of weight; the "Pistonair" with reversible four or five cylinder motors; and compact, rugged electric-powered models which feature space-saving short-length external motors.

Joy Single Drum Hoists are built with lifting capacities ranging from 500 to 3500 lbs., and rope capacities from 150 to 1500 ft. "Pistonair" models have a positive acting safety brake which holds the load in any position when the throttle valve is "off."

Joy also manufactures a complete line of Shaft Hoists, and Two- and Three-Drum Slusher Hoists in capacities to handle all hoisting and scraping needs.

Have you seen this film?

"HARD ROCK MECHANIZED MINING"

16 mm-Sound and Full Color-40 Minutes

Write for a FREE Showing

Address our Film Booking Office.

Write for Bulletin, or . . .

Consult a Joy Engineer

W&D M 4028

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Steel

BULWARK OF FREEDOM, BUT . . .

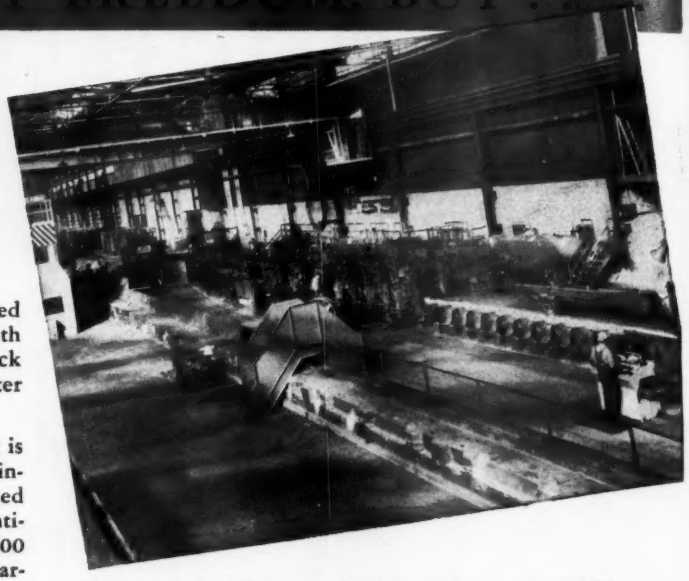
Vulnerable to Socialistic Rust!

Urged on and on by the incentives afforded by our free enterprise system—Americans, with the private money of thousands of stock holders, have built a Bulwark of Steel greater than all the rest of the world.

The capacity of America's steel industry is so great that in 24 hours, it can turn out ingots and castings sufficient to provide finished steel for—500 airplanes, 500 tanks, 1,000 anti-aircraft guns, a half million 3-inch shells, 1,000 howitzers, 2,000 aerial bombs, 1 aircraft carrier, 2 heavy cruisers, two cargo ships, two tankers, 1,000 freight cars, 2,000 trucks, 12,000 automobiles, 20,000 refrigerators, 20,000 stoves, 2,000 homes, and still have 23,000 tons of steel for other purposes.

Remove the incentives of free enterprise or burden it with excessive restrictions and our magnificent steel industry will be vulnerable to the wasting erosion of socialistic rust.

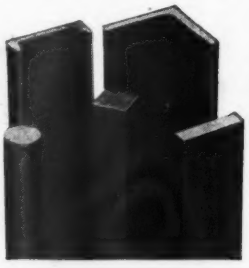
SHEFFIELD
STEEL
CORPORATION
HOUSTON KANSAS CITY
TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION



Most Modern of Merchant Mills

On this highly mechanized 12-inch merchant mill, steel billets are more efficiently rolled into a wide variety of merchant shapes and sizes vital to manufacturing.

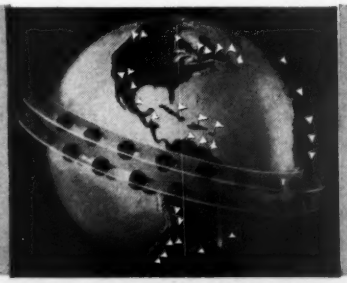
It is a typical example of the continuing modernization and expansion program of Sheffield Steel which, in the last ten years alone, has more than tripled the at-home steel making capacity of Sheffield Steel mills. New furnace and blooming mill capacity now under construction will enable Sheffield Steel to continue to pace industrial progress with an ever increasing supply of steel—the vitamin A of industrial growth.



SHEFFIELD
MERCHANT STEEL

There are few industries that do not use merchant steel. Sheffield Steel mills roll a wide variety of bars and shapes.

SHEFFIELD
MOLY-COP
TRADEMARK REG.
COPPER-MOLYBDENUM-ALLOY
Grinding Balls



USED AND PROVED ALL AROUND THE WORLD

Sheffield Products: Carbon and Alloy Steel, Ingots, Blooms, Billets, Plates, Sheets, Hot Rolled Bars, Steel Joists, Structural Shapes, Reinforcing Bars, Welded Wire Mesh, Wire Products, Wire Rods, Fence, Spring Wire, Nails, Rivets, Grinding Media, Forgings, Track Spikes, Bolt and Nut Products

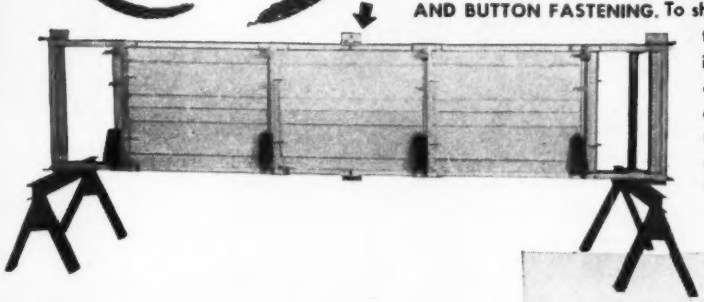
Export Representative: ARMCO INTERNATIONAL CORPORATION • Middletown, Ohio

A *New* HEAVY DUTY BELT CONVEYOR for Shuttle Car gathering in low coal

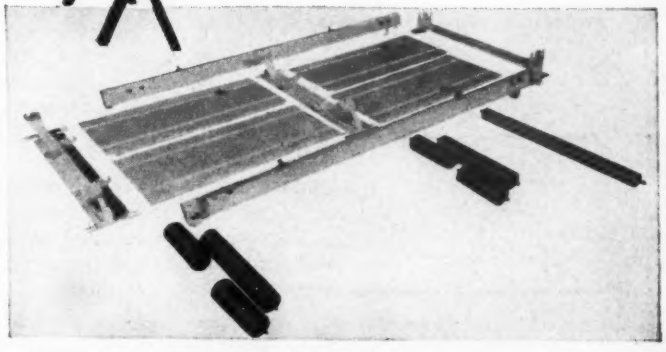
THE *Goodman* TYPE 98

NEW extra strong intermediate sections of 8-foot length, "knockdown" design, permit easy handling where space is limited.

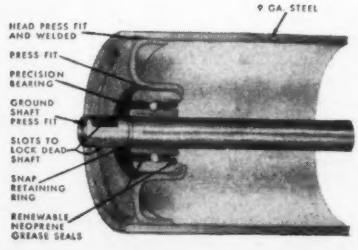
NEW pre-lubricated, *renewable* seal, precision idler bearings for low maintenance and long attention-free service.



GOODMAN PATENTED LOCK-JOINT DESIGN STRONGER THAN HOOK AND BUTTON FASTENING. To show the unusual lateral strength and rigidity of the Type 98 belt construction, two assembled intermediate sections have been placed on edge and supported at each end. Even though the center joint is unsupported, there is no lateral movement. The deflection (only ⅜", see arrow) at this center point is due solely to the flexing of the side channels.



ONE MAN CAN HANDLE HEAVIEST PIECE. The heaviest piece in the intermediate section is the 8-foot side channel weighing only 47 lbs. Total weight of section is but 406 lbs. To disassemble a section, only four cap screws need be removed; others are merely loosened. Deck height of the assembled section is 7½".



BEARINGS HAVE HIGH RATING AND GIVE ECONOMICAL SERVICE. The Type "A" Goodman pre-lubricated, *renewable* neoprene seal, precision idler bearing can be cleaned, relubricated, and resealed thus permitting attention-free operation and economical service. The advantages of this Goodman precision bearing are high shock resistance, heavy loads at high belt speeds, no greasing and ease of repair at mine.

The Goodman Type 98 Belt Conveyor is available for 30" and 36" belt widths with idler rollers of 2½" to 5" diameter in either offset or in-line arrangement. Moreover, by the use of adaptor frames the type 98 intermediate sections can be used in the line with any underground belt conveyor (30" or 36"). Ask for Catalog CC-522.

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gives HIGHER OUTPUT

Exclusive Hydraulic Torque Converter Drive Is One BIG Reason Why

The hydraulic torque converter drive, *exclusive* in the Allis-Chalmers HD-20 Tractor, brings you productivity, handling ease and dependability that makes every hour, every day of the season count . . . gives the operator the equivalent of hundreds of gear ratios in two speed ranges . . . automatically selects the proper speed for maximum production.

Dozing — With hydraulic torque converter drive you take full advantage of available horsepower . . . roll bigger loads, tackle tougher dozing jobs. Master clutch engages under cushioned protection, yet power is achieved *instantly* with velvet-like smoothness. This means fewer repairs . . . longer life of tractor and auxiliary equipment.

Pulling — There's nothing like the HD-20 for sheer productive power. Torque converter actually multiplies torque up to four and one-half times . . . develops tremendous drawbar pull to start the load smoothly, and automatically accelerates to highest speed conditions permit, in either high or low range.

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Pushing — The HD-20 makes smoother contact, automatically matches speed to pushed equipment, maintains steady contact while loading, sends load off to the fill in a higher speed.

Get the full story now from your Allis-Chalmers dealer. See why the HD-20 does more work, more easily, at less cost . . . and why it is worth waiting for.

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at flywheel

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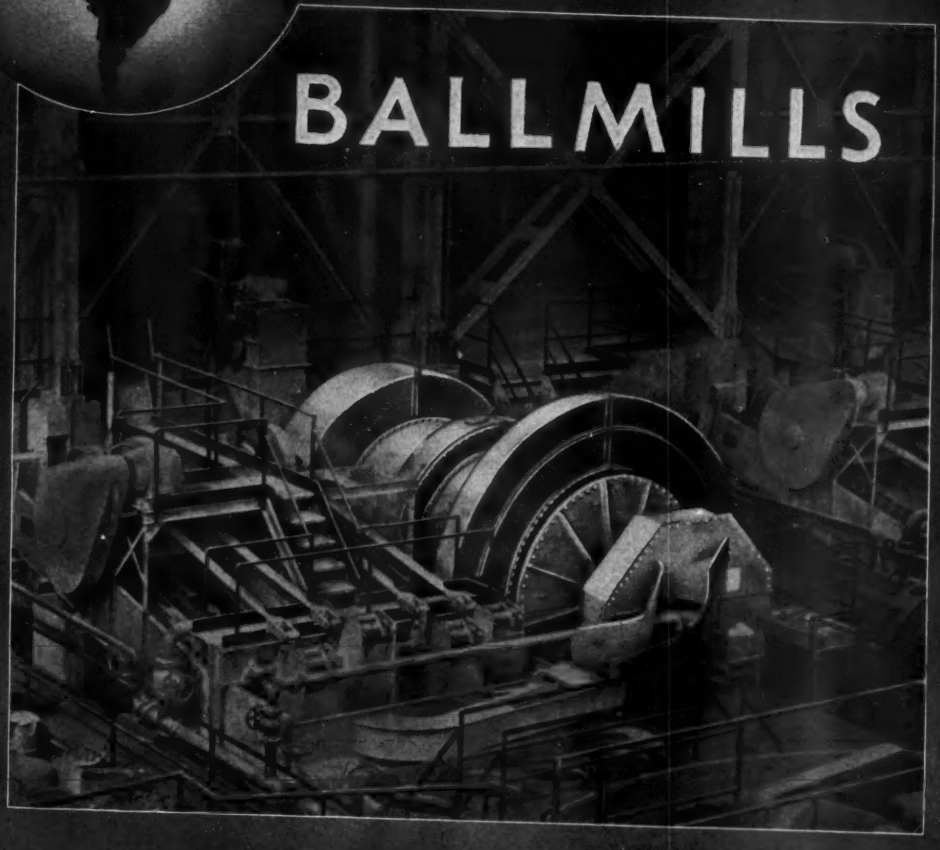

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HAZARD REDSHOT* TYPE RG

*Hazard Redshot is the only shot firing cord made in the easy-to-separate, round, parallel form.

Cross section Actual size

Examine it in every detail and you'll find Hazard Redshot has everything you need and want in shot firing cord. It's service-designed and precision manufactured especially for safe, sure blasting in coal mining operations.

Insulation and sheath are combined in one single compound—tough, strong Hazaprene—proved beyond question for its durability in severe service. A uniformly thick, double wall of Hazaprene separates the parallel laid conductors, prevents shorting. This Hazard construction eliminates fibrous fillers which can absorb and retain damaging moisture...reduces conductor resistance...prevents "kinking" of cord in use...provides extra flexibility for easy coiling and uncoiling.

You'll also like the bright red color of Redshot which makes it highly visible; the grooved insulation for easy separation at connections; the quick way it strips clean for easy splicing. Hazard Redshot Type RG Shot Firing Cord fully meets the flame-resistant requirements of U. S. Bureau of Mines and Pennsylvania Department of Mines. For free sample of new Hazard Shot Firing Cord, mail the coupon below today. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

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Wilkes-Barre, Pa.

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HAZARD

BETTER Coal Preparation Plants *Call for* EXPERIENCE

Plus MODERN DEVELOPMENTS BORN OF TECHNICAL RESEARCH

Way back in 1905 Heyl & Patterson designed, fabricated and erected its first complete Coal Preparation Plant. The succeeding years have witnessed many additional H & P contracts for complete Preparation Plants for the Coal Industry.

Today, more than ever, the building of satisfactory Coal Preparation Plants calls for many years of specialized experience in the cleaning and preparation of coal and a "progressive outlook" for new and improved methods of coal preparation.

Heyl & Patterson is constantly searching for ways to improve coal preparation methods . . . to save money . . . to increase efficiency . . . to increase production.

Heyl & Patterson has the experience, the facilities and the personnel to take an assignment from the "idea" stage through the "successful operation" stage. We have our own Engineering Department . . . our own Research and Development Department . . . our own Structural Shop . . . our own Machine Shop . . . our own Erection Department . . . and the desire to improve on what has already proven successful.

Heyl & Patterson can guarantee Controlled Low Cost, because WE CAN DO THE WHOLE JOB . . . all the way from design to erection and satisfactory operation.

A Fine Coal Cleaning Plant recently completed by H & P for a large Ohio coal producer serves as an example of how H & P incorporates modern improvements in the design and erection of Coal Preparation Plants. It is equipped with two products of H & P's Research & Development Department . . . H & P Cyclone Thickeners and an H & P Thermal Coal Dryer.

A partial view of H & P 14" Cyclones discharging underflow which contains recovered −10 to −100 mesh fines.

A feed-end view of the Heyl & Patterson Thermal Coal Dryer.

Heyl & Patterson, Inc.

"SINCE 1887"

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Heavy Bulk Materials Handling Equipment

All The Way from Design to Erection

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HELPS YOU DO A BETTER, MORE EFFICIENT JOB

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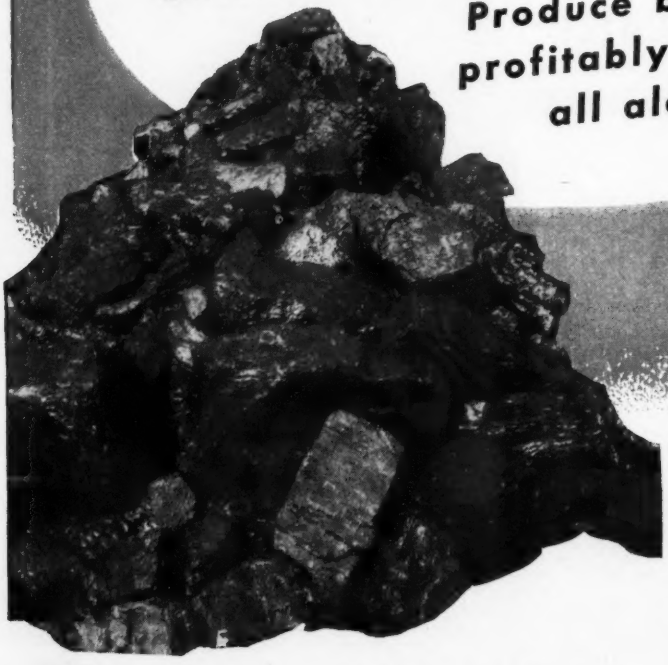
more ECONOMICAL PRODUCTION

AIRDOX
CARDOX

NON-EXPLOSIVE MINING METHODS

Produce better coal—more profitably—with savings all along the line



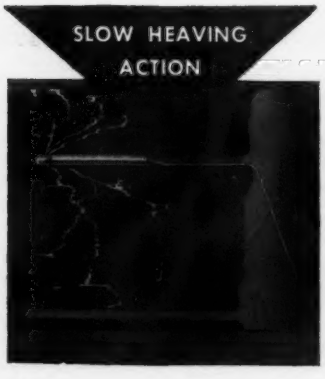
Typical fall of coal broken with Airdox. Note high percentage of large sizes. So little dust is raised by this type shooting that miners may begin loading coal almost immediately after the shot.

You uncover a whole string of advantages—all tied in to lower cost, safer mining—when you use AIRDOX or CARDOX to *break loose*, not *blast loose*, a fall of coal. Here's why:

Both use powerful, non-shattering forces—the one compressed air, the other expanding carbon dioxide—to *heave* the coal forward in a looser pile that's easier for mechanical loaders to handle. They both produce less fines—which means easier cleaning and less cleaning loss. Coal holds up better in handling, transit and storage, with minimum degradation.

Equally important, both AIRDOX and CARDOX, help keep mine roofs freer of shatter-cracks, which reduces expensive maintenance. Both eliminate fire or explosion resulting from shooting, enabling many mines to save time and money through *safe* on-shift shooting.

In an ever-increasing number of mines, AIRDOX and CARDOX are proving their worth as low-cost production tools. Let us show you how they can help *you* produce lower cost, yet higher quality, more marketable coal.



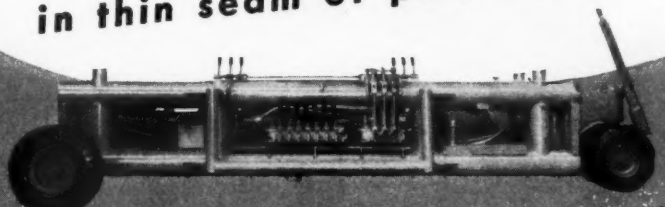
Which Method for You?

Both Airdox and Cardox offer impressive advantages and economies. Which is best for you can be determined after our engineers have joined yours in studying your mining operation. There's no obligation, just ask that one of our men call on you soon.

plus "BONUS" TONNAGE

CARDOX-HARDSOCG *Underground* AUGER MINER

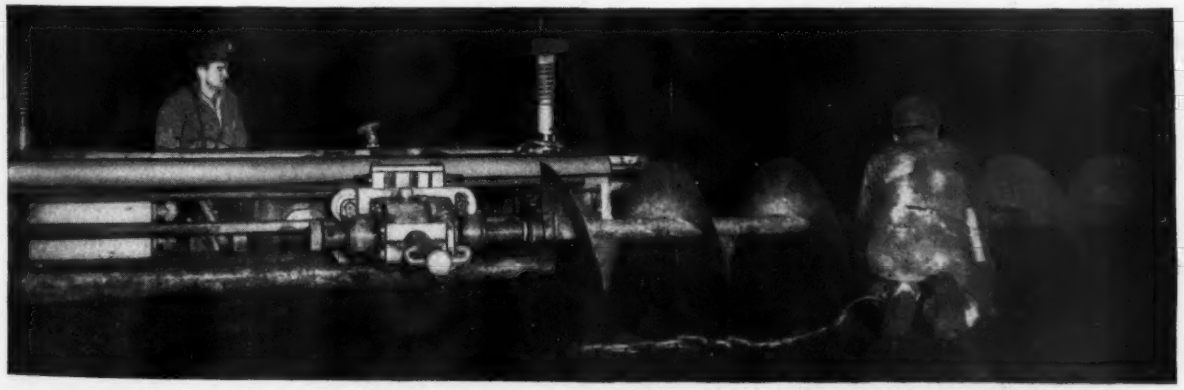
Turns "lost coal" into "profit coal" in thin seam or poor roof areas



Underground AugerMiner. Its movable rubber tired tramming gear and low overall height make it easy to move and set up in confined areas.

The Cardox-Hardsocg Underground Auger-Miner gives you profitable production of coal that is impractical to mine by any other means. The machine and its operators remain safely in the area of good roof condition while the auger drills high grade coal out of the thin seam or poor roof area—and at a cost that's usually far less than the original working.

The 25 HP Auger Miner handles augers up to 28″ in diameter in 6′ sections that are quickly and easily coupled to drill as far as 100′ into a seam.



AugerMiner in operation. Vertical direction control keeps auger firmly in seam away from shale or other impurities. Hydraulic roof and floor jacks keep machine firmly in place. Set-up provides top efficiency when teamed with portable conveyor for rapid coal removal.

In Mines and Quarries "EUCS"

HAUL MORE TONS AT LESS COST

Hope to see you at the Denver Mining Show...Be sure to visit space 901 and our big outdoor exhibit at the main entrance.

Built for tough off-the-highway hauling, Rear-Dump and Bottom-Dump "Eucs" have stepped up production and cut hauling costs on hundreds of open pit mining and quarry operations.

Euclids have proved their efficiency and long life in hauling a wide variety of materials... coal, ore, rock, overburden and other heavy excavation. Bottom-Dumps are powered by diesel engines of 190 to 300 h.p.... loaded speeds up to 34.4 m.p.h.... available in 20 to 40-ton capacities. Rear-Dump "Eucs" have travel speeds up to 36.3 m.p.h.... powered by diesel engines of 125 to 400 h.p. ... range in capacity from 10 to 34 tons.

Your Euclid Distributor has performance data on jobs similar to yours. Ask him for a Euclid hauling cost estimate — there's no cost or obligation.

The EUCLID ROAD MACHINERY Co. • CLEVELAND 17, OHIO

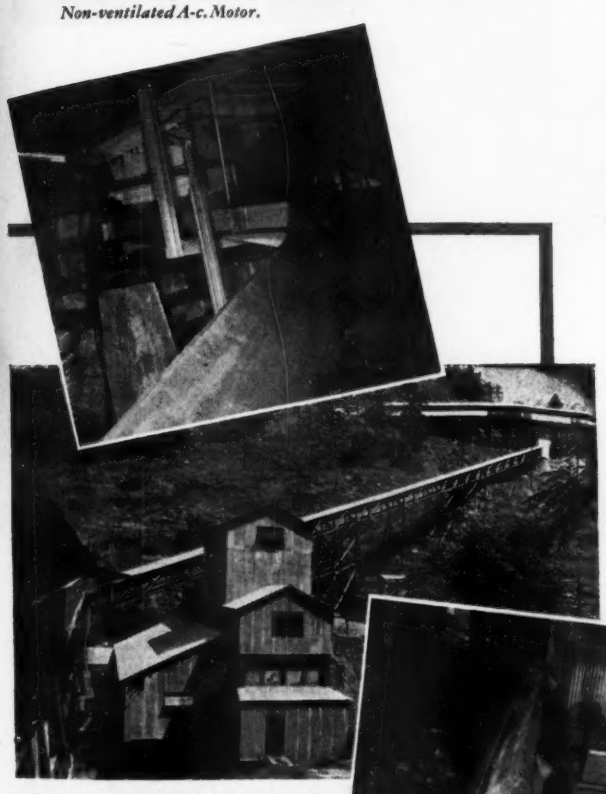
EUCLIDS

Above ground, too...

RELIANCE
Precision-Built
MOTORS

Reliance PRECISION-BUILT *Totally-enclosed, Non-ventilated A-c. Motor.*

do a Good Job on the Tough Jobs!



Reliance two-speed motor (top) effectively regulates volume of coal passed by eccentric feeder onto decline conveyor (right). Movement of conveyor with 12-ton load is controlled by Reliance two-speed motor with integrally mounted brake.

Wherever coal is mined, more and more operators are discovering that Reliance PRECISION-BUILT A-c. Motors provide the maximum in dependable and economical power on every job above and below ground.

These rugged, long-lived motors applied to shaking and vibrating screens, washers, pumps, air tables, crushers, feeders and conveyors will offer you invaluable assistance in keeping production up and costs down. PRECISION-BUILT Motors are made in all standard enclosures, in sizes from 3/4 to 300 hp. Write today for Bulletins B-2101 and B-2201. For Explosion-Proof Motor data ask for Bulletin C-130.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

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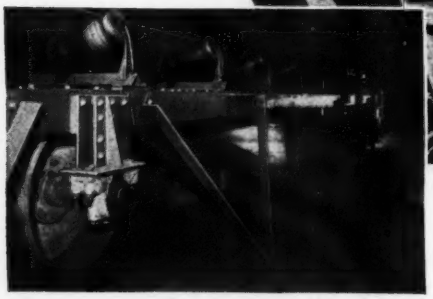
How does U. S. Rubber's twisted belt handle wet ore?

BELT BEING TWISTED as it leaves vertical gravity take-up before running over return idlers.

(right) GENERAL VIEW of belt carrying iron ore from crushers to stock pile. (Mather Mine, "B" Shaft of the Negaunee Mine Co., operated by the Cleveland Cliffs Iron Co., at Negaunee, Mich.)



RETURN STRAND of belt being twisted before reaching tail pulleys.

PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

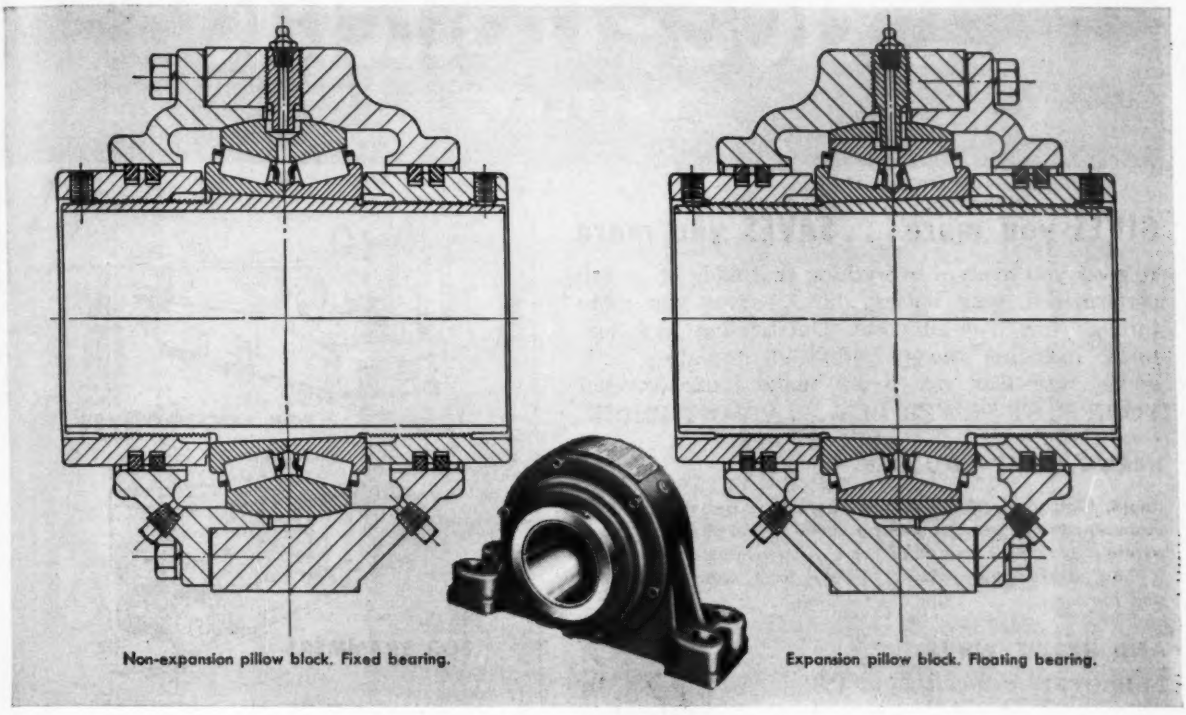
This belt is twisted behind the head pulley to make the clean side of the belt run against the return idlers, preventing wet iron ore from building up on them. The belt is twisted again before it reaches the tail pulley, so that the load is placed on the carrying side of the belt. Installed at a mine in Michigan's Upper Peninsula, this U. S. Matchless belt is 1425 feet long, 36 inches wide. It is used to stockpile ore above ground.

United States Rubber Company engineers have the research facilities and the experience that enable them to build the right kind of belt for your needs. They are specialists in reducing haulage costs and raising output. Write to address below.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

NEW TIMKEN® BEARING PILLOW BLOCK



Non-expansion pillow block. Fixed bearing.

Expansion pillow block. Floating bearing.

First application of new tapered bore TIMKEN® bearing makes new Dodge-Timken pillow block more compact

IT takes up less space. It weighs less. Yet the new Dodge-Timken® All-Steel pillow block has tremendous load-carrying capacity.

It's the result of the combined achievements of the Dodge Manufacturing Corporation, Mishawaka, Indiana, and The Timken Roller Bearing Company and makes use of an entirely new Timken bearing. Never before has a self-aligning, non-adjustable tapered roller bearing with tapered bore been used in pillow blocks.

Being of all-steel construction, this new Dodge-Timken pillow block is more compact and fills a real need where space is a factor. It is available in both expansion and non-expansion designs. And it incorporates all the advantages of Timken tapered roller bearings.

Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. Line contact between rollers and races gives Timken bearings load-carrying capacity to spare. Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—and under normal conditions will last the life of the machinery with which the pillow blocks are used.

When you install new Dodge-Timken pillow blocks, you can expect dependable performance because the bearings are the best. No other bearing can give you all the advantages you get with Timken bearings. Specify them for all your other machinery, too. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST →⬭← LOADS OR ANY COMBINATION

THE IMPROVED Exide-Ironclad BATTERY

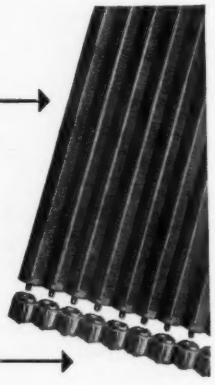
GIVES you more . . . SAVES you more

It gives you more of everything that adds up to top performance, long battery life . . . saves you more through low over-all costs. Outstanding new features, including the polyethylene insulating tube sealer, *more than ever before*, make Exide-Ironclad YOUR BEST POWER BUY . . . AT ANY PRICE.

HERE'S WHAT YOU GET

Rapid, high production haulage, more trips per shift . . . High maintained voltage, with uniform speed to end of shift . . . High availability . . . Low operating costs . . . Low maintenance costs . . . Low depreciation costs . . . Safety from hazards of fire and fumes.

AND HERE'S WHY



IMPROVED POSITIVE PLATE CONSTRUCTION. The long-life grids now contain SILVIUM—an alloy of silver, lead and other components—which makes them highly corrosion-resistant.

NEW POLYETHYLENE INSULATING TUBE SEALER of acid-proof, non-corroding plastic. It fits snugly into slotted tubes of positive plates, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus more active material remains available, and the high battery capacity is maintained for a longer working life.

PLUS THESE EXTRAS

IMPROVED NEGATIVE PLATES for higher electrical efficiency.

NEW SEALING COMPOUND provides permanent seal between jar and cover.

SEAMLESS SHOCK-PROOF JAR, of high-quality rubber. A scientifically selected combination of tensile strength and elongation provides a sturdy jar built for long-life and heavy-duty service.

NEW UNBREAKABLE PLASTIC VENT PLUGS of polyethylene.

TYPES, SIZES AND CAPACITIES for battery-electric mine haulage units of every make.

THE ELECTRIC STORAGE BATTERY COMPANY
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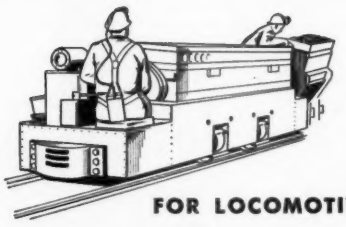
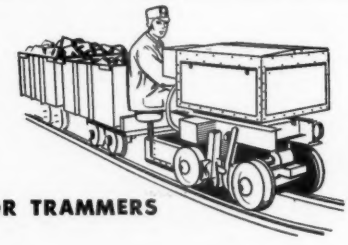
Exide Batteries of Canada, Limited, Toronto

1888
DEPENDABLE BATTERIES FOR 64 YEARS
1952



FOR LOCOMOTIVES



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FOR SHUTTLE CARS

Exide-Ironclad

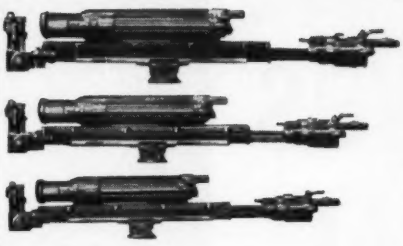
IS YOUR BEST POWER BUY

. . . AT ANY PRICE

POWER

"EXIDE-IRONCLAD" and "SILVIUM" *Reg. T.M. U.S. Pat. Off.*

★ Air-feed sinkers — 2-way feed, 2 sizes. They take the back-breaking work out of drilling horizontal holes, lighten the load on your miners, and increase tonnages.



★ Power-feed and hand-cranked drifters. Dependable, powerful, and fast. Ideal for columns and jumbos alike.

★ A complete line of sinkers from 18 to 80 lbs. including the popular 45-lb. H10, and 55-lb. H111.

It's Le Roi-CLEVELAND

for

Rock Drills You Can Count On

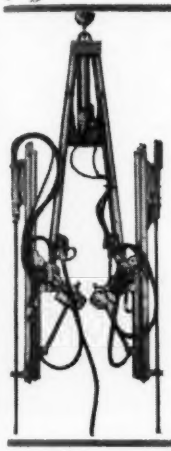
. . . . . fast-drilling, dependable favorites of mining men since 1906

Of course, you know that Le Roi-CLEVELAND builds the popular, easy-holding H10 and H111 sinkers... the fast-drilling PD24, 25, and 14 power feed drifters . . . the S11 and SS22 stopers with trip rotation for easier handling . . . and a mine jumbo that lets you drill out your rounds faster, with greater safety.

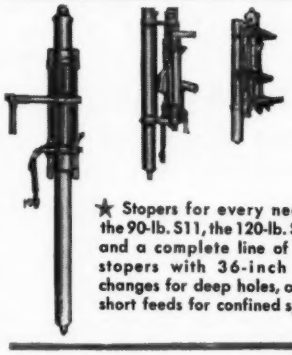
But did you know that Le Roi-CLEVELAND was responsible for some famous "firsts"? Here are a few of them—work-savers that help your miners increase their man-shift production: the air-feed sinker, the offset stoper, the shaft sinker, the stoper jumbo.

So if you have a job of drilling to do—do it with Le Roi-CLEVELAND machines. You can count on them. They're built for speed. And they're built to stay underground, too — where you can use this speed to do more work and cut your costs.

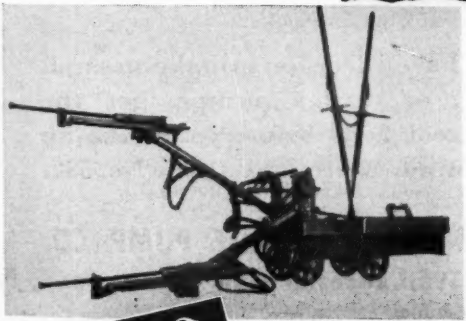
Detailed information about the complete Le Roi-CLEVELAND rock drill line is yours for the asking. Just write us.



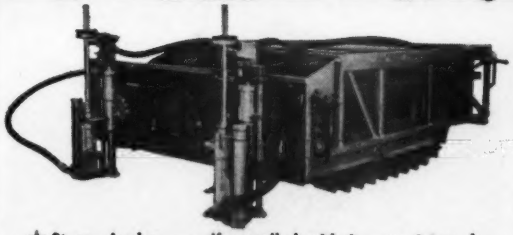
★ The SDR 34 shaft sinker for faster shaft sinking. Fully closed it's 5'6" between drill centers; open 19'3". All adjustments quickly made with air motor.



★ Stopers for every need — the 90-lb. S11, the 120-lb. SS-22, and a complete line of offset stopers with 36-inch steel changes for deep holes, or with short feeds for confined spaces.



★ The famous MDR Jumbo with air-motor poweredbooms for quicker set-ups, greater safety, faster rounds.



★ Stoper jumbo — self-propelled with its own integral dust-collection system for positive dust control, the latest thing for roof bolting.

LE ROI COMPANY

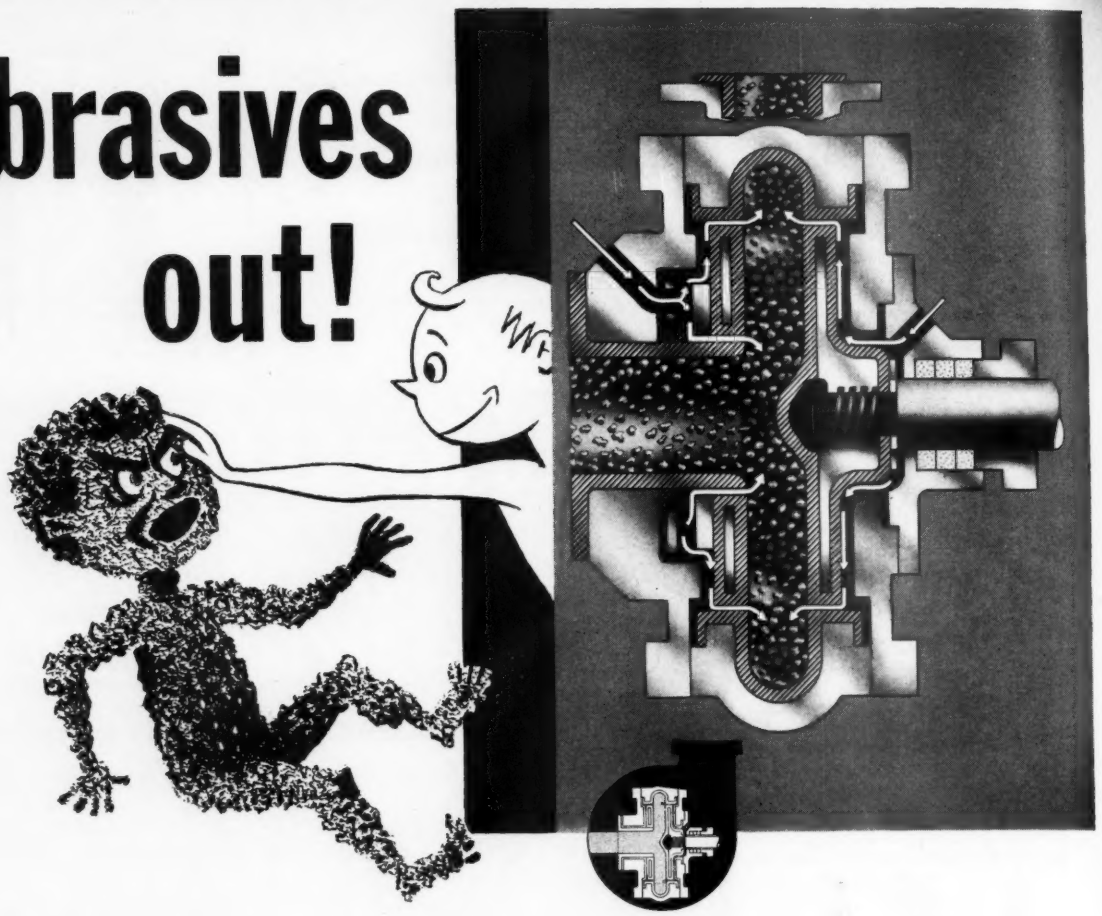
RD-39

CLEVELAND ROCK DRILL DIVISION

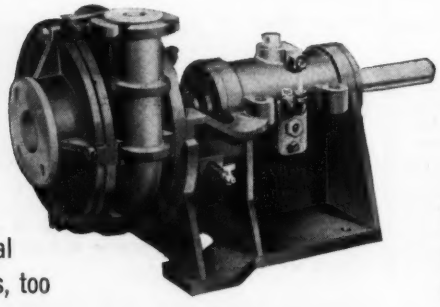
12500 Berea Road, Cleveland 11, Ohio

Plants: Milwaukee, Cleveland and Greenwich, Ohio

Abrasives out!



Abrasives are kept from making trouble in Hydroseal Pumps by a small amount of clear water that flows in the direction shown by the arrows. At a pressure slightly above pump discharge, this sealing water prevents abrasives from entering the clearances between the impeller and side plates. "Double pumping" is thus eliminated, giving high initial efficiency. More important, since this hydrosealing protects close clearances from wear, these pumps maintain their high efficiency for life. As a result, power savings alone generally pay for Hydroseals in a short period of time.



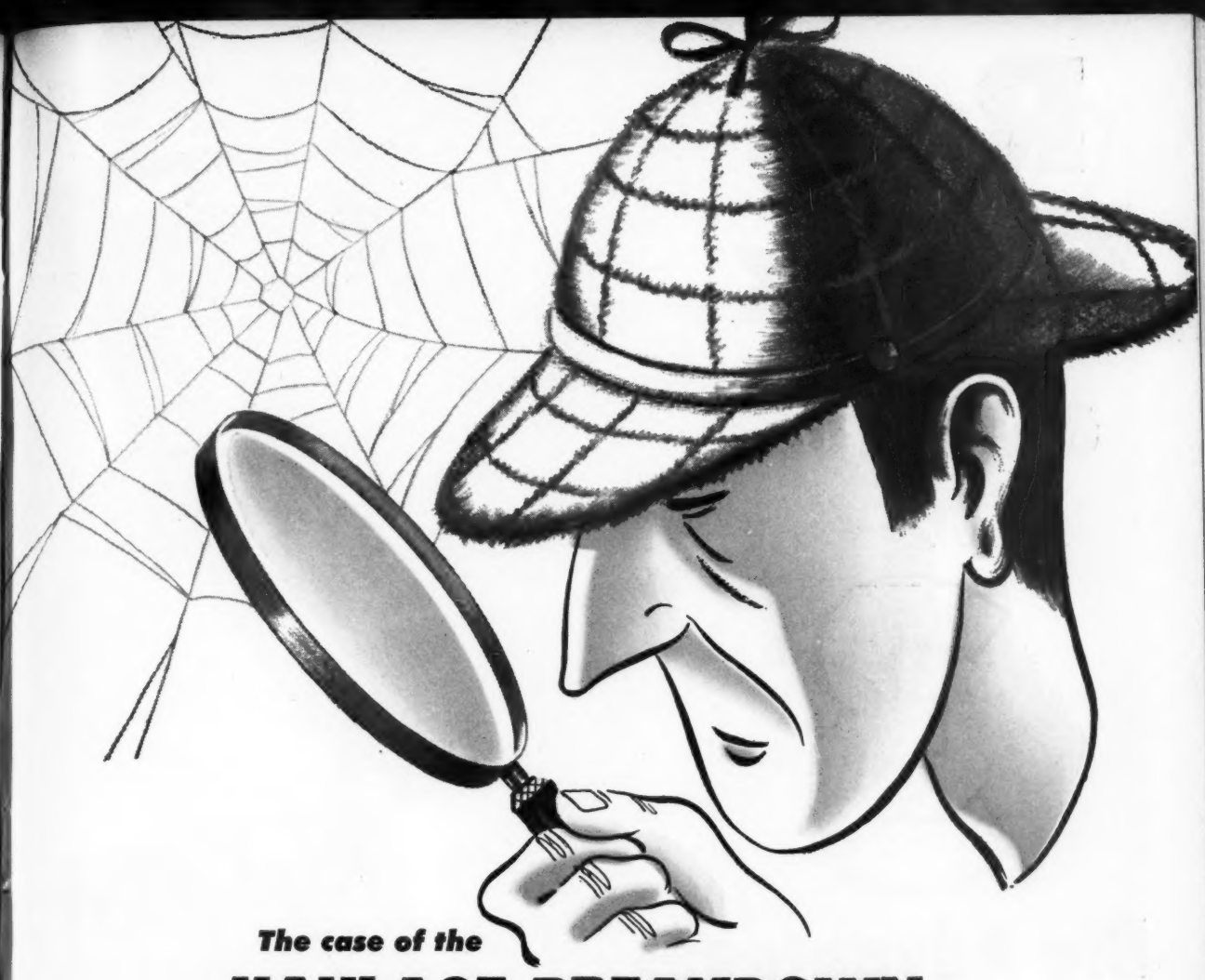
Vertical pumps, too

If you have a decision to make on sand, slurry, or dredge pumps, get the Hydroseal facts before you make up your mind. Write for Catalog No. 552.

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. K-259E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

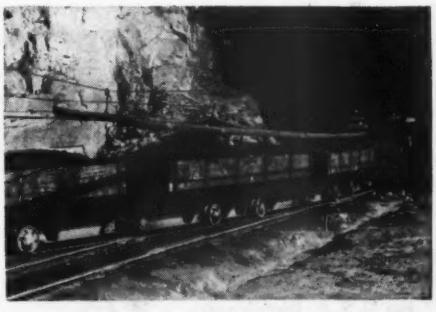


The case of the

HAULAGE BREAKDOWN

It happened in the middle of the morning. Things were running smoothly—then production stopped. It didn't resume again that day.

With mine cars, this need never have happened—for mine cars minimize the danger of total transportation shut-down. When a car needs minor repair, it's shunted to a siding. The remaining cars continue working—maintaining the production schedule. *Only with mine cars is this possible!* ✓ ✓ ✓ And there are other advantages, too. Men and supplies ride into the mine—making your transportation system pay both ways. ✓ ✓ ✓ So, if you're planning a new mine, mechanizing your present mine, why not call in your A.C.F. Representative. He can give you some interesting facts on the advantages of A.C.F. Mine Cars. American Car and Foundry Company, New York · Chicago · St. Louis · Cleveland · Philadelphia · Washington · San Francisco · Berwick, Pa. · Huntington, W. Va.



a.C.f.

MINE CARS

for Constant Haulage

Rod Deck

Gives You These 3 Big Advantages

Ripl-Flo ROD DECK SCREENS

LESS BLINDING! Sticky materials go through slotted openings between rods with less trouble than through conventional wire cloth or perforated plate. Rods provide a positive cutting action.

GREATER CAPACITY! Undersize passes long openings between rods more readily than through conventional screen surface. There's more open area — and cross wire blockage is eliminated. More tonnage and larger feed can be handled with a rod deck screen.

LONGER LIFE! Rod deck design permits using heavy 3/16 to 1/2 in. rods. The rod deck costs less to operate than a conventional screen — you need only replace worn rods, not an entire screen surface.

MONEY-SAVING APPLICATIONS

- For scalping ahead of crushers.
- Preparing grinding mill feed.
- To replace conventional double deck screen. Rod deck requires less head room, reduces operating cost, handles larger size feed.
- Any screening operation where square separation is not necessary.

Ripl-Flo is an Allis-Chalmers trademark.

ALLIS-CHALMERS

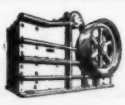
Find out how rod deck screens can cut costs and reduce downtime in your operations. Call the A-C representative in your area, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3752

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

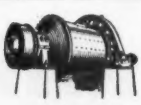
Hammermill

Vibrating Screens



Jaw Crushers

Gyratory Crushers



Grinding Mills

Kilns, Coolers, Dryers

What's ahead for you?

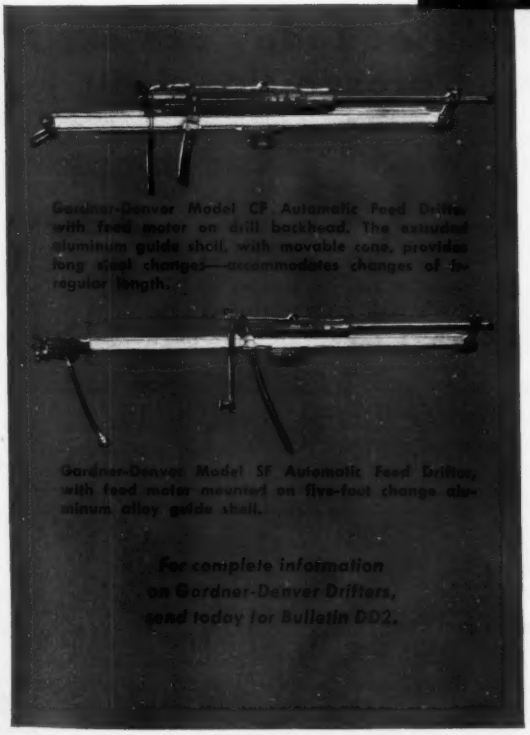
Increased demands for ore production from your mine?

A stepped-up development program to reach your ore reserves?

Hard rock you've got to "hole through" in a hurry?

A program to hold down production costs?

Gardner-Denver CF89H Automatic Feed Drifters.



Gardner-Denver Model CF Automatic Feed Drifter with feed motor on drill backhead. The extruded aluminum guide shell, with movable cone, provides long steel changes—accommodates changes of 3x regular length.

Gardner-Denver Model SF Automatic Feed Drifter, with feed motor mounted on five-foot change aluminum alloy guide shell.

For complete information on Gardner-Denver Drifters, send today for Bulletin DD2.

For help in solving mining problems such as these, choose famous Gardner-Denver Automatic Feed Drifters. They're designed by men who know what it takes to do a fast, low-cost drilling job underground.

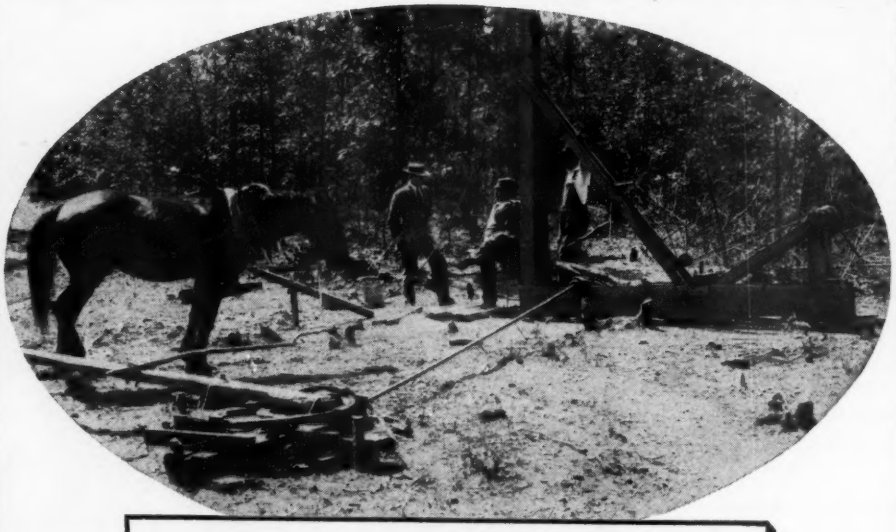
The Gardner-Denver self-adjusting feed, for example, responds automatically to bit penetration — is automatically regulated by the type of ground being drilled. Maximum drilling speed is easily maintained—"green" miners drill almost as fast as "old-timers." The long-wearing, "slow-motion" piston feed motor is economical to operate, too—uses only 3% to 5% of the total air consumption of the drill.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS



REST PERIOD

Missouri lead mine—about 1890. The work of raising the stem of this ancient drill for punch through rock was fatiguing for both man and beast. Prospecting like this was tough and costly.

An enlargement of this photo suitable for framing is yours for the asking.

Times Have Changed...

But some blasting techniques used today are as obsolete as this horse-operated prospecting drill!

Miners have replaced horses with machines . . . have learned to make the most of *mechanical* power to bring out more ore at less cost. But they cannot forget that blasting practices must also be kept up to date to show a profit.

That's why alert mine operators are re-examining standard blasting practices. And they are finding that milli-second delay detonation—pioneered by Atlas in the ROCKMASTER Blasting System—is now leading the field in making the most of explosives energy.

The ROCKMASTER system constantly is being developed to give even more effective drill patterns and loadings for underground work . . . properly tailored to a particular job. ROCKMASTER blasting gives miners results never before possible . . . plus control over breakage, throw, noise, and vibration.

Bring *your* blasting practices up to date *now*. Send for the free 20-page booklet on ROCKMASTER blasting.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

SAVING DOLLARS AND TIME . . .

McAlester Fuel Company have the contract to supply lignite for the new Alcoa plant being constructed at Rockdale, Texas. Since production from this new plant is important to meet the demands of the defense effort, preparations for the supplying of fuel had to be met in a minimum of time. Topographic maps from air photographs compiled by Jack Ammann Photogrammetric Engineers were the answer.

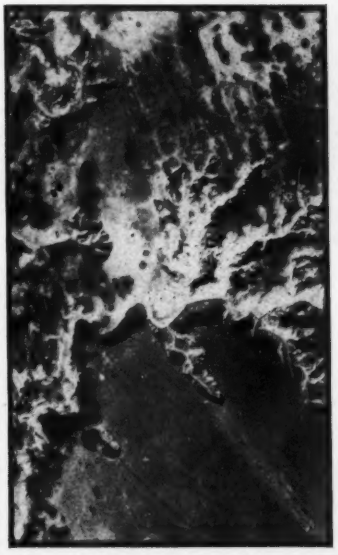
McAlester Fuel Company estimates that 60 days of time and $18,000 in money were saved by resorting to our photogrammetric methods as compared to the next best method.

Here is our time table on this job:

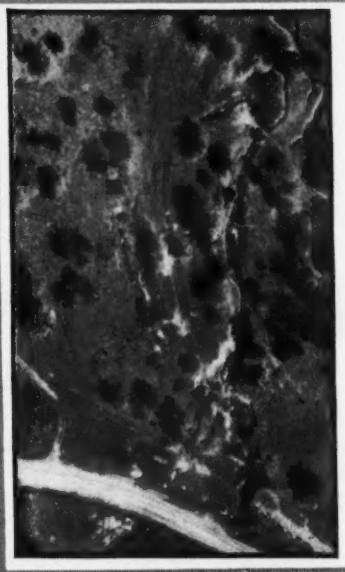
DATE 1952	ELAPSED TIME	OPERATION
Feb. 14		Contract signed
Feb. 17	3 days	Aerial photography completed
Feb. 22	8 days	Photographs delivered
Apr. 2	48 days	First topographic maps delivered
Progressive deliveries of topographic maps each week as completed.		
May 28	104 days	Final delivery of 5' contour maps
Jul. 26	163 days	Final delivery of 2' contour maps

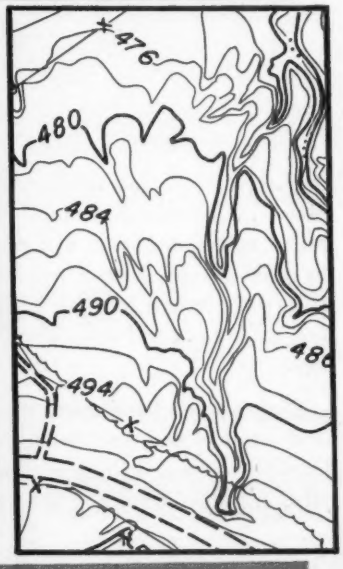
This example of the saving of time and money in producing topographic maps from air photographs is typical of what Jack Ammann Photogrammetric Engineers are doing in many varied lines of business and industry. Feel free to consult us on your problem. There's no obligation.

See our advertisements in American City, Civil Engineering, Public Works, Oil and Gas Journal, Electric Light and Power, Bulletin of the American Association of Petroleum Geologists, Oil Reporter and Photogrammetric Engineering for data on other outstanding mapping jobs we have completed for other industries.



19559 Ac—5' Contour Maps Scale 1" = 200' showing Ownership Data. Used for measuring acreage and property acquisition, transmission line location, inventorying timber, location of access roads and rail spurs, dam location and reservoir study and for many other purposes.





1012 Ac—2' Contour Maps Scale 1" = 200' Used for detailed stripping plans, computing overburden, etc.

Jack Ammann

PHOTOGRAMMETRIC ENGINEERS

BROADWAY AT TENTH · SAN ANTONIO 5, TEXAS

AIR SURVEYS—MAPS

EASTERN OFFICE: 32 HILLCREST, P. O. BOX 411 — PHONE MANHASSET 7-1840 — MANHASSET, N. Y.

NEW CRUCIBLE DOUBLE DIAMOND takes drill steel out of the "CROWBAR CLASS"

At last! A drill steel that's not in the "crowbar class" . . . because Crucible's new DOUBLE DIAMOND hollow drill steel is a *tool* steel . . . made by drill steel specialists to tool steel specifications. Its greater fatigue strength means lower cost per foot drilled . . . and saves those *valuable carbide bits*.

Find out first hand about this step forward in drill steel — find out how Crucible DOUBLE DIAMOND in your drilling operation does a better job . . . faster! Write for full details. Do it now!

this Alloy Hollow Drill Steel has greater fatigue strength . . . cuts bit losses . . . lasts longer

CRUCIBLE first name in special purpose steels

52 years of Fine steelmaking

HOLLOW DRILL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

PROGRESS IN EXPLOSIVES . . .

EXPLOSIVES PARADOX

Don't be misled by the "old style" mule. This is a scene at an up-to-date dynamite plant. "New style" is the modern air conditioning equipment shown in the background.

Air conditioning enables Hercules to control atmospheric conditions while the dynamite is being packaged behind the barricade. In other words, it keeps your powder dry.

This is another example of Hercules pioneering that gives you better made explosives with better blasting efficiency.

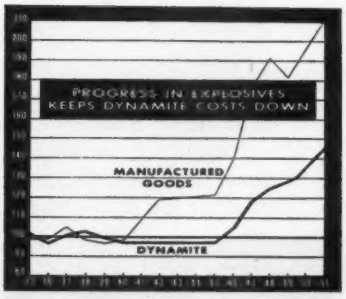


Chart shows relative stability of dynamite prices since 1935, as compared with prices of other manufactured goods. 1935-39 values=100.

HERCULES POWDER COMPANY

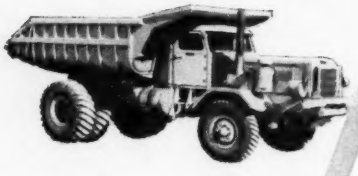
INCORPORATED

Explosives Department, 92 King St., Wilmington 99, Del.

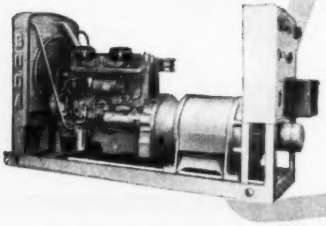
XR52-5

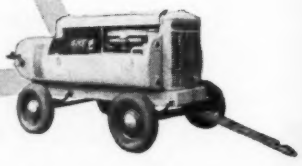
BUDA DIESELS

MONEY MAKERS IN YOUR SHOVELS AND DRAGLINES...



EQUALLY PROFITABLE IN ALL YOUR OTHER EQUIPMENT





When leading Shovel and Dragline builders pick Buda Diesels to power their equipment they choose them for good reasons: —longer life, lower operating cost—minimum maintenance . . . more power . . . greater torque . . . extensive parts & service.

These same money-making advantages of Buda Diesels can be applied to almost every other piece of construction equipment you own. Don't miss a chance to repower with Buda Diesels . . . they're designed with your profits in mind.

Facts and performance sell Buda Diesels. Get full details from your nearby Buda Distributor today. Write for Bulletin. *The Buda Company, Harvey, Illinois*

BUDA

There's a Buda Diesel for Every Need

BC-23

Manufacturers of Material Handling Equipment, Lifting Jacks, Maintenance of Way Products, Earth Drills and Diesel and Gasoline Engines

for lower **first** and **last** costs

power with this tough cable

ANACONDA

BUTYL-INSULATED HIGH-VOLTAGE CABLE

—easier to install—lasts longer

—handles better

Mine after mine comes up with the same answer. So do pit and quarry operators. *It pays to use this modern power cable—* ANACONDA Type AB*, for uses up to 15 kv. It is exceedingly hard to damage by impact, crushing, twisting or abrasion. Butyl insulation has superior long-aging characteristics, improved resistance to moisture, ozone, heat. Neoprene jacket—as tough as they come—has real flexibility and great strength. This cable handles well and lasts longer in all weather. It has high dielectric strength, affords excellent protection against acids, oils, and even flame.

Our mine specialists will gladly show you a sample of this safety cable. And they can also show you just the right cable for your shovels, drills, shuttle cars, and the new continuous mining machines. See how recent improvements have made famous ANACONDA Securityflex* portable cables even better. Call your nearest Anaconda Sales Office or Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trademark 52356

- *butyl insulation*
- *neoprene jacket*
- *copper tape shielding*
- *color coding*
- *stranded copper ground wire*

the right cable for the job **ANACONDA®** wire and cable

when you use

AMERICAN CYANAMID COMPANY
EXPLOSIVES

The shovel man and the shooters are all good friends on any job that uses American Explosives. These dependable explosives make it easy for the shooters to get just the right breakage required—the overburden has been readily removed, giving the shovel a clear "shot" at the coal.

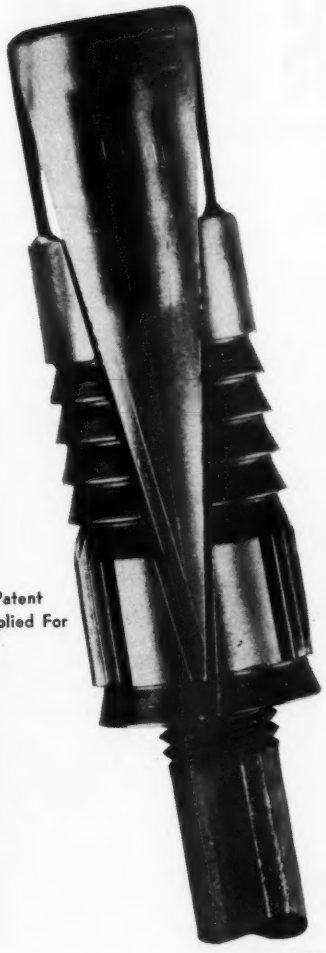
American Explosives—the products of careful research and testing—come in a variety of densities and velocities. They are available from any one of several conveniently located plants and distributing magazines . . . *make your next order American.*

Capable Field Engineers are Available at Your Call

High Explosives • Permissibles • Blasting Powder • Blasting Accessories

AMERICAN Cyanamid COMPANY
Explosives Department
30 ROCKEFELLER PLAZA • NEW YORK 20, N. Y.

Sales Offices: Pittsburgh, Pa., Bluefield, W. Va., Scranton, Pa.
Chicago, Ill., Pottsville, Pa., Maynard, Mass.



Patent Applied For

New PATTIN Roof Bolt Shell Doubles Expansion and Holding Area—

THE NEW PATTIN EXPANSION SHELL offers many advantages in that it provides double expansion plus a 3-inch parallel contact with the hole. No definite drilling depth is required as the shell can be anchored at any place in the hole. The PATTIN shell anchors solidly and will not turn while being tightened. Wedge and shell being locked together prevents loss of parts in handling. No special nuts or ears are required on the bolts. For additional information or a demonstration write our Marietta office.

THE PATTIN SPLIT TYPE BOLT, one of the first slotted bolts, continues to be a favorite wherever split type bolts are used. The bolt is a full 1-inch in diameter with cut threads and furnished with Hex or square nuts and various size plates and wedges.

STYLE D

ALL MINING COMPANIES now bolting, experimenting or planning to roof bolt can depend on PATTIN shells and bolts for better anchorage and reduced time in bolting cycles. Our engineers are available for consultation and demonstrations. Write us—we'll gladly work with you on any present or future bolting program.

STYLE A

PATTIN MANUFACTURING CO.

"The Pioneer in Roof Bolting"

Est. 1888

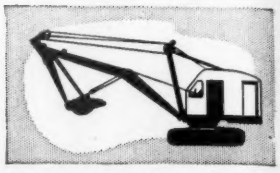
MARIETTA, OHIO

Here's more digging force!

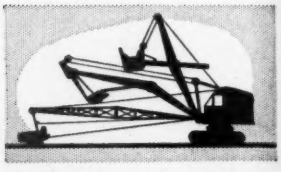
Powerful LS-90 hoists and swings simultaneously

OLIVER IRON MINING CO., at Mt. Iron, Minn., is building a new pilot Taconite plant—and the brute strength of this LS-90 serves on a broad range of the construction work. The LS-90, owned by Paul Degrugillier, is used by Stearns & Rogers Mfg. Co. on this big job.

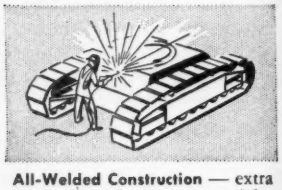
Here are LINK-BELT SPEEDER PLUS FEATURES that work for you



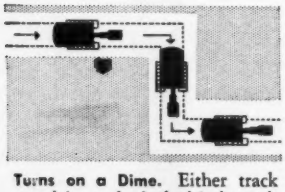
Gooseneck Trench Hoe—improved digging and dumping plus far less undercutting of the machine on deep cuts.



Convertibility — designed for peak production as shovel, crane, dragline or trench hoe. Convert in field—quickly, easily.

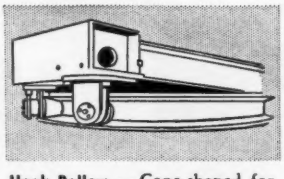


All-Welded Construction — extra strength without extra weight. Resists impact and twist. Field service simple, fast.



Turns on a Dime. Either track can drive or be locked independently. Digging lock controlled from cab.

Self-Cleaning Crawler Treads — eliminate compacting. Track shoe lug meshes with pocket in the drive wheel—ejecting material.



Hook Rollers — Cone-shaped for *true* rolling. Reduce roller and roller path loads—eliminate center pin pull.

High Ground Clearance — eliminates snagging or fouling in rough areas. No projecting castings or easily damaged parts.

12,849-A

LINK-BELT SPEEDER
CORPORATION

Builders of the most complete line of shovels, cranes and draglines

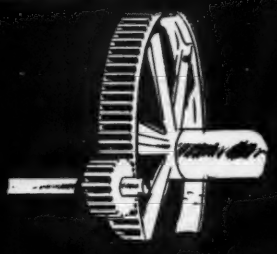
CEDAR RAPIDS, IOWA

Amscoating

The Right Way to Say Hard-facing for every Industrial Use

AMSCO TOOLFACE for metal to metal wear up to 1000 F. Deposits have high abrasion and impact resistance. All diameters bare and coated. Microstructure: martensitic steel.

AMSCO TUBE TUNGSITE (coarse particles) is best suited for applications requiring highly efficient cutting qualities, for hardfacing earth working and drilling equipment used for cutting extremely hard compositions, for hardfacing applications requiring a serrated edge and hard-facing certain types of earth working equipment or parts subject to extreme abrasion.



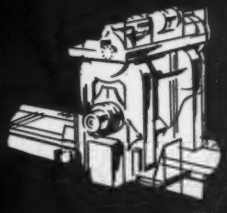
AMSCO HF-60 for moderate impact and abrasion and has outstanding weldability particularly for vertical applications. All diameters, coated only. Microstructure: martensitic steel.

AMSCO FARMFACE or AMSCO CHROMEFACE for farm or industrial use. Excellent resistance to low stress sliding abrasion. All diameters, bare and coated. Microstructure: a high chromium austentitic iron containing manganese and silicon, and consisting of hard chromium carbides in a matrix of austentite.

AMSCO No. 217 for abrasive service up to 1000 F. All diameters, bare and coated. Microstructure: an air hardening martensitic iron alloy containing chromium and tungsten.

AMSCO HF-40 for severe abrasion, moderate impact. Deposits have excellent weldability. All diameters, coated only. Microstructure: martensitic cast iron.

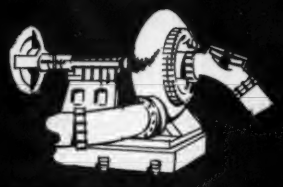
AMSCO AIR-HARDENING for abrasion and severe impact. Deposit can be forged to sharp edge without loss of hardness. All diameters, bare and coated. Microstructure: martensitic steel.



AMSCO AW-79 will meet most requirements for better control of wear where abrasion and impact are important factors—plus all the advantages of automatic welding. Especially suitable for rebuilding and hardfacing tractor rollers, steel wheels, sheeting rolls, dredge pins, as well as dozens of other automatic applications. 3/32" and 1/16" in 22½" ID., 100 lb. coils.

AMSCO V-MANG, bare or coated, for build up and repair on manganese steel castings exposed to impact; work hardens—3/32", 1/16", 1/4". Microstructure: austenitic manganese steel.

AMSCO CO-MANG, coated only, for build up and repair of manganese steel castings exposed to severe impact. Deposit has excellent impact resistance; work hardens—1/8", 5/32", 3/16", 1/4". Microstructure: austenitic manganese steel.



AMSCO TUNGROD (fine particles) is best suited for applications requiring highly efficient cutting qualities, for hardfacing earth working and drilling equipment used for cutting extremely hard surfaces or formations, for hardfacing applications requiring a thin edge or small point, for hardfacing certain types of equipment or parts subject to extreme abrasion.

AMSCO ECONOMY HARDFACE "C" for abrasion resistant service and severe impact. All diameters, coated only. Microstructure: martensitic steel.

AMSCO No. 1 and AMSCO No. 6 for combination of corrosion and abrasion or for 1000 F. service and above. No. 1 has greater abrasion resistance; No. 6 is tougher and can be machined. All diameters, bare and coated. Microstructures: No. 6 contains an eutectic carbide mixture in a solid solution matrix, while No. 1 contains large hard wear-resistant chromium carbide crystals scattered through a solid solution matrix.

AMSCO No. 459 for severe abrasion, mild impact. Excellent abrasion resistance. All diameters, bare and coated. Microstructure: martensitic cast iron containing chromium and molybdenum, consisting of hard carbides, austentite and martensite.

To get the right answer, detailed analyses, and other pertinent information, concerning your wear problem, write for catalog 650W or contact your nearest Amsco Distributor.

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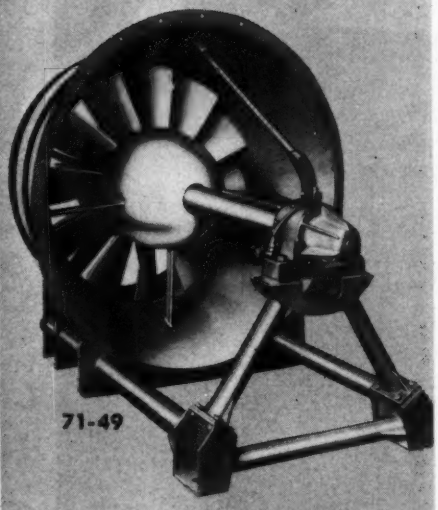
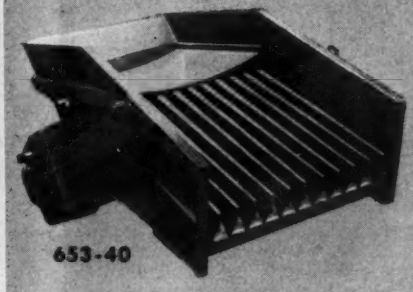




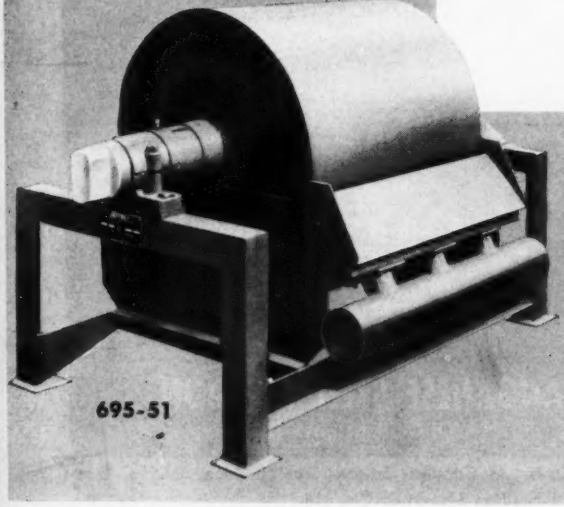
Learn about "Mechanizing for Profit" with Jeffrey equipment. There is a unit in our broad line to meet your need exactly. Some of them are pictured here. Read about them—then give us a chance to go to work for you.

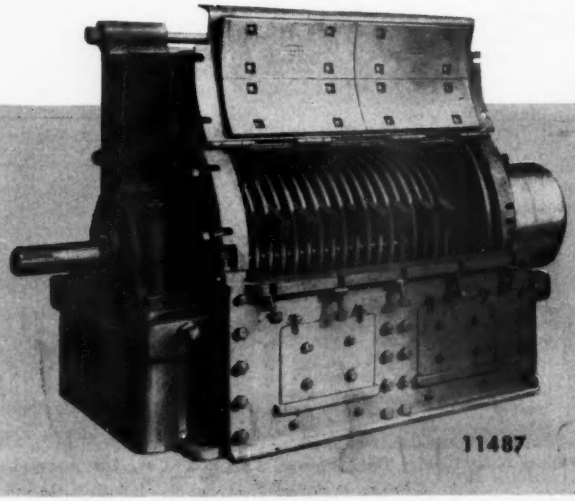
AERODYNE FANS—Shown is the Jeffrey 12-A-58 Fan designed for 13" W. G. maximum pressure—volumes up to 600,000 c.f.m.—internal self-circulating oil lubrication and separate ball thrust bearings. 1½ and 5 h.p. Blowers are available also. For efficient ventilation send for a Jeffrey fan expert.

VIBRATING FEEDERS—Grizzly and Pan Feeders of the electric vibrating type in a wide range of sizes and capacities. The Grizzly Feeder (left, center) provides both a feed and non-clogging grizzly in a single unit—is extremely flexible and handles large tonnages.

MAGNETIC SEPARATORS — View, left-below, shows the Jeffrey type CO Magnetic Separator—designed especially for the recovery of magnetic medium in a standard Heavy Media plant. Jeffrey Magnetic Separators are of the drum type, which has the advantage of extreme simplicity. High capacity—minimum of supervision. Bulletin No. 846 discusses Jeffrey designs in detail.

CRUSHERS—The Jeffrey Type B Swing Hammer Crusher is of extra heavy construction—well adapted for severe duty. Being used successfully on limestone, shale, slate, clay, chalk, marl, gypsum, phosphate rock, asbestos rock and others. A 36" x 24" armorplate Swing Hammer Crusher is shown below.





Mining And Material Handling Equipment

For Metal and Non-Metallic Mining

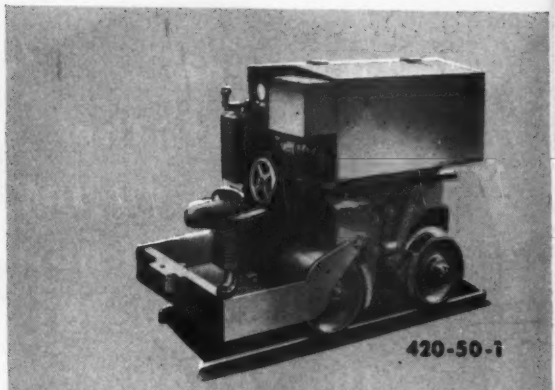
STORAGE BATTERY TRAMMERS—The Jeffrey Trammer Locomotive is of compact construction and meets all gauges down to a minimum of 18" —has a 6 H.P. motor, weighs 1½ tons. Can be arranged for trolley or cable reel operation. Unit is 34" wide, 46" high and overall length is 62" with hinged motorman's platform.

HAULAGE LOCOMOTIVES—Jeffrey 15-ton Trolley Locomotive (right) with these features: air-operated Contactors, Brakes, Sanders and Horn; anti-friction Journals and Axles; Blower to ventilate motors. These dimensions: wheelbase—100", 36" gauge, length—21'8", width—67", height over cab—72", height over covers—44", diameter of wheels —38".

BELT CONVEYORS—The Jeffrey 80-A Sectional Belt Conveyor with its intermediate sections is frequently used where ore and other material must be carried continuously over long distances. Available in 30, 36 and 42-inch widths—speeds from 175 to 500 feet per minute—capacities up to 18 tons per minute. An intermediate section is shown right-below.

420-52

BLOWERS
5 H. P. AERODYNE MIDGET Blower
Free Delivery Volume —6200 C.F.M.



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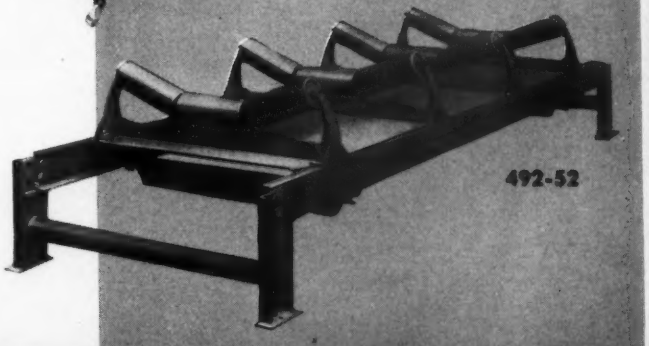

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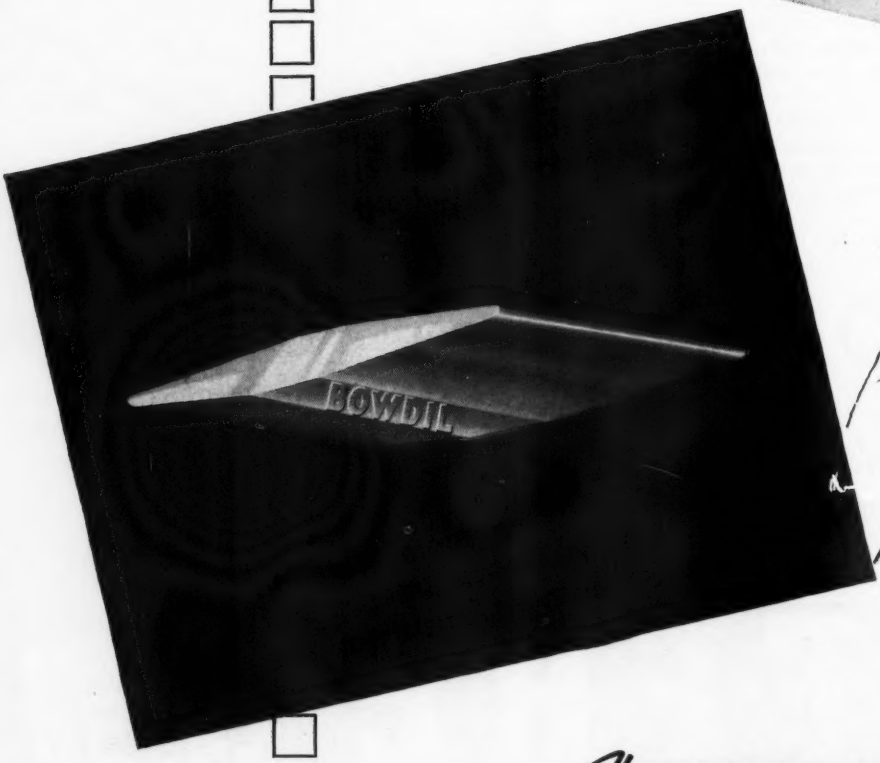

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PRECISION CONTROL MEANS BETTER METALLURGY!

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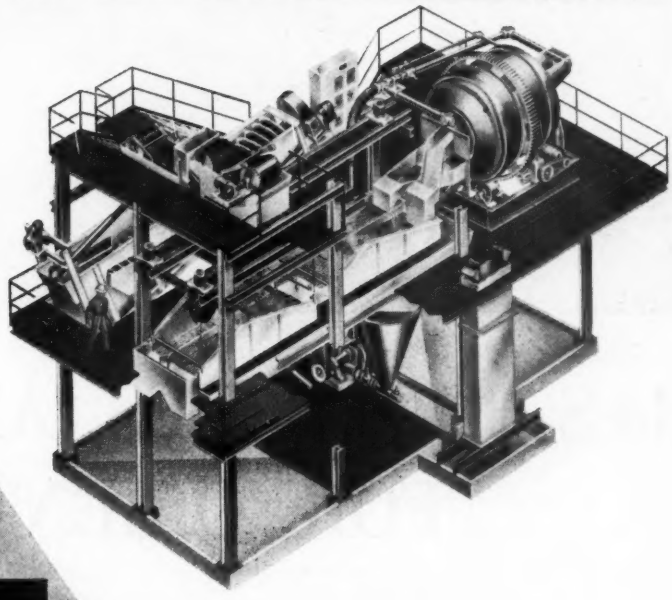
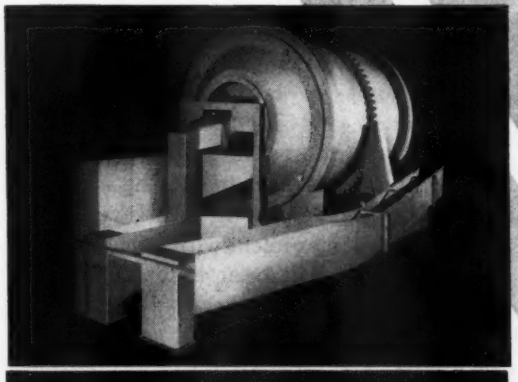
WEMCO design allows accurate control of media density and positive sink removal—assures higher grade concentrate and lower tailings.





VERSATILE PERFORMANCE BOOSTS OPERATING PROFITS!

WEMCO MOBIL-MILLS give you **three** types of separators to choose from—fits the equipment to your problem for optimum operating efficiency:

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3. **WEMCO** Cone Separator gives efficient, low cost separation on ores where a finer range of feed sizes requires greater volume of medium.

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- *Low initial cost*
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- *Capacities 5 to 275 TPH*

Write today for descriptive bulletin and information on how a Mobil-Mill can improve your beneficiation problem.

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Chicago, Wilmington and Franklin Orient Mine No. 3 preparation plant, equipped with R&S Super-Airflow units.

R&S FURNISHES AIRFLOW No. 6 FOR ORIENT No. 3

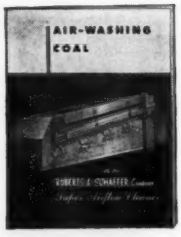
One of six Super-Airflow units for air-washing minus 7/16" stoker coal at C. W. & F. Orient Mine No. 3

One of the highlights of our incoming mail this summer was an order for a sixth Super-Airflow unit for installation at Chicago, Wilmington and Franklin's Orient Mine No. 3 preparation plant, illustrated above. We were doubly glad to get the order because it illustrated the satisfaction of C. W. & F. management with the five Super-Airflows that had been in operation dry cleaning minus 7/16" stoker coal in the plant since its completion in 1951.

Orient No. 3 is the third Airflow-equipped C. W. & F. plant . . . so you know that they have had ample opportunity to put Airflows to the test!

Whether you are like C. W. & F. and a growing list of other companies who have found air-washing the solution to some of their toughest preparation problems . . . or whether wet-washing or heavy media separation is the answer to your problem . . . you will find that Roberts & Schaefer Company is a reliable headquarters for competent, unbiased counsel.

Bulletin No. 175 tells the full Super-Airflow story. Copies available on request →



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Editorials

JOHN C. FOX, *Editor*

OCTOBER, 1952

Chalk Up Another Record

IN every respect the 1952 Metal and Nonmetallic Mineral Mining Convention and Exposition, in Denver, was a record breaker. More people registered than ever before. More manufacturers exhibited more new equipment than ever before. More people took part in the general and operating sessions than ever before. And never before had any meeting been held in the newly enlarged City Auditorium.

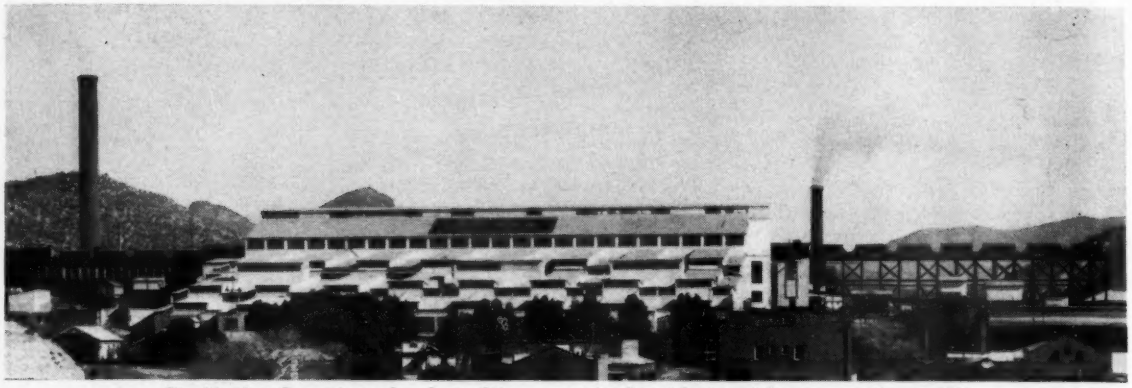
This meeting was a far cry from the first meeting held in Denver more than half a century ago. Then the American Mining Congress was a newborn infant, now it is the recognized representative of the entire mining industry and speaks with the united voice of mining men everywhere.

Since the last previous meeting in Denver, in 1946, a lot of water has passed under the bridge. Then we had just come through a global war, during which the American mining industry had set production records to supply the "Arsensal of Democracy" with the raw materials needed to fight that war. Then hope ran high for a brave new world and a long era of real peace. But that dream was to last for a short time only. Now we are engaged in a different kind of war and the nations of the Western World are once again fighting for survival. American Mining is called upon again to supply the raw materials to arm the Free World, and at the same time maintain a flow of materials into a civilian economy the like of which the world has never seen. It is called upon to do this in the face of many obstacles.

What these obstacles are and how the mining men of this country propose to overcome them was the undercurrent of the entire Mining Show. In the general sessions, the legislative, social and economic aspects of the problems were faced and proposals for their solutions made. The consensus of the mining industry on these matters is reflected in the Declaration of Policy approved by the convention and reproduced for all to read on pages 71-76 of this issue. In the Exposition the manufacturers of mining and milling machinery, equipment and supplies presented the latest developments and improvements, designed and built to enable mining men to increase production and lower costs, with maximum safety. In the operating sessions, the men who use the machines told how they are doing so, effectively and economically.

These be parlous times indeed, but one gathered from the representatives of every branch of the mining industry at this, the greatest of all Metal and Nonmetallic Mineral Mining Conventions and Expositions, that American Mining is a vital, growing industry, equal to any challenge. Many records have been made and broken in the past. Each new one set is a dare to go on to CHALK UP ANOTHER RECORD.

Milling Methods at Hayden



The Hayden Concentrator has been doing an outstanding job since it began operating in 1911

Grind and Treat 15,000 Tons of Ore Per Day from both Underground and Open-pit Copper Mines at Kennecott's Ray Mines Division

By J. L. STEVENS

Mill Superintendent
Ray Mines Division
Kennecott Copper Corp.

THE concentrator of the Ray Mines Division, Kennecott Copper Corp., is located at Hayden, Ariz., near the junction of the Gila and San Pedro Rivers, approximately 20 miles from the mines at Ray, Ariz. The comparatively large area of ground available for economic tailings disposal and the certainty of ample water supply were the two important factors in determining this particular location.

During its operating life, since 1911, the concentrator has been remodeled a great number of times, the most recent having taken place during the last three years in order to treat additional tonnages from the newly-developed open pit mine at Ray.

In the recent remodeling of the concentrator, the chief changes comprise the installation of four 10½ ft by 14 ft Allis-Chalmers overflow type ball mills, four 24-ft Dorr bowl drag classifiers of the new HX type and four 14-ft Dorr drag classifiers, also of the HX type. Because of the general character of the ore, the newly-installed classifier and ball mill equipment is used in an intermediate stage of classifying and grinding between the rod-mill operation and the final grinding operation, thus making a three-stage reduction operation in the fine crushing and grinding flow sheet. The flotation plant was also remodeled, using modified Callow type cells for the roughing circuit and level type Fagergren cells in the cleaning circuits.

Ore Hard to Grind

Ore as received from the coarse crushing plant at Ray will average approximately 4½ percent plus ¾ in., and 89 percent plus 100 Mesh, the major portion of the material being concentrated in the coarser screen sizes. In general, the ore from the pit, and particularly the diabase ore, is relatively stubborn to crush and grind, compared to the schist ores from the underground mine. While chalcocite is the predominant copper mineral, substantial amounts of copper in other forms, such as chalcopyrite, metallic copper, cuprite, various copper silicates, copper carbonates and other oxides, together with variable amounts of copper sulphate are present in the current ores. The chalcocite occurs as a replacement of pyrite and exhibits all gradations from thin films associated with the pyrite to complete replacement.

Grinding equipment at the concentrator is divided into four sections, each section comprising one 9 by 12-ft rod mill, one 24-ft bowl drag classifier, one 10½ by 14-ft ball mill, one 14-ft drag classifier, two 18-ft bowl drag classifiers, four 7 by 10-ft ball mills and four 8-ft drag classifiers.

Crude ore is fed to the rod mills of each section at a rate of approximately 3750 tons per day. The rod mills are operated substantially in open circuit; however, a small amount of the rod mill discharge (approximately five percent of the total) containing oversize material is returned to the rod mill. The product of the rod mill is fed to the 24-ft bowl classifier where the major portion of the finished material is removed by overflowing the bowl at 30 percent solids. The sands from the bowl classifier are fed to the 10½ by 14-ft ball mill which operates in closed circuit with the 14-ft drag classifier. Overflow from the 14-ft drag classifier at 50 to 54 percent solids is fed to two 18-ft bowl drag classifiers where finished material is removed by overflowing the bowls at 30 percent solids. Sands from the 18-ft bowl classifiers are fed to four 7 by 10-ft ball mills which operate in closed circuit with four 8-ft drag classifiers. Overflow from these classifiers is maintained at approximately 33 percent solids. The overflow products of the bowl classifiers and the 8-ft drag classifiers are combined for flotation.

Rod Mills for Fine Crushing

Rod mills are of the overflow type, charged with 3½-in. rods and operated at 14 rpm. Shell liners are wave type, white iron, with 24 manganese lifter bars. The local rod mills were pioneered by Mr. W. I. Garms, who found many operating advantages over rolls which were formerly employed. Among these were the elimination of certain auxiliaries inherent with rolls which resulted in a marked reduction in maintenance costs. Messrs. J. F. Myers, E. H. Rose, and others have made valuable contributions in their studies of the functioning of rod mills.

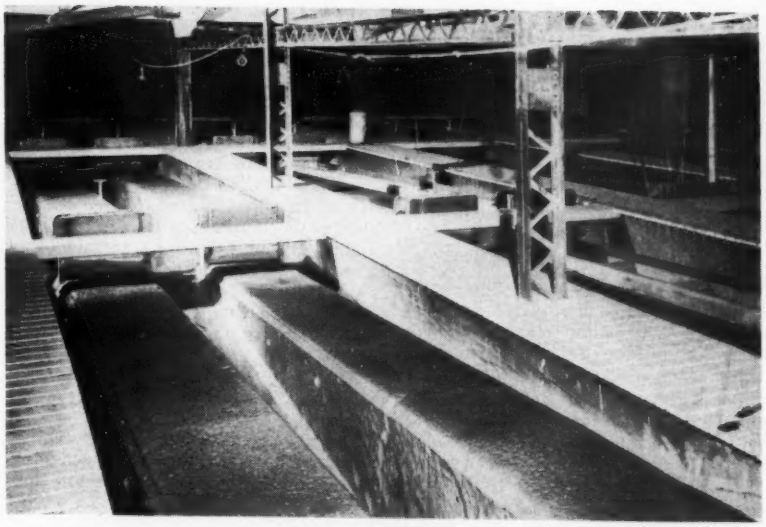
With present knowledge of the functioning of a rod mill, management at Hayden considers it as being strictly a fine crushing mill which should be operated substantially in open circuit and be employed only to reduce ore to a suitable size for ball mill feed. Efficiency of the rod mill is highest when

fed the maximum tonnage of material it is capable of digesting. The rod mill functions as a screening machine and produces a minimum amount of slime material. A major portion of the fines produced in the rod mill consists of material that is readily released from the ore. Another unique feature of rod mill performance as compared with a ball mill is that all of the material fed to the mill has to pass spirally and longitudinally through the rod load before being discharged. The pool in an overflow rod mill is usually from 4 to 6 in. below the level of the discharge trunnion. Thus it is seen that the road load tends to pick up the entire charge of pulp and all of the mill feed is subjected to a crushing or disintegrating action before it can escape the mill. This action is very important in dispersing slimes such as gouge or other similar material, usually present in the ore. In general, such slime material has a tendency to flow through the pool of a ball mill and escape the necessary treatment for proper dispersion.

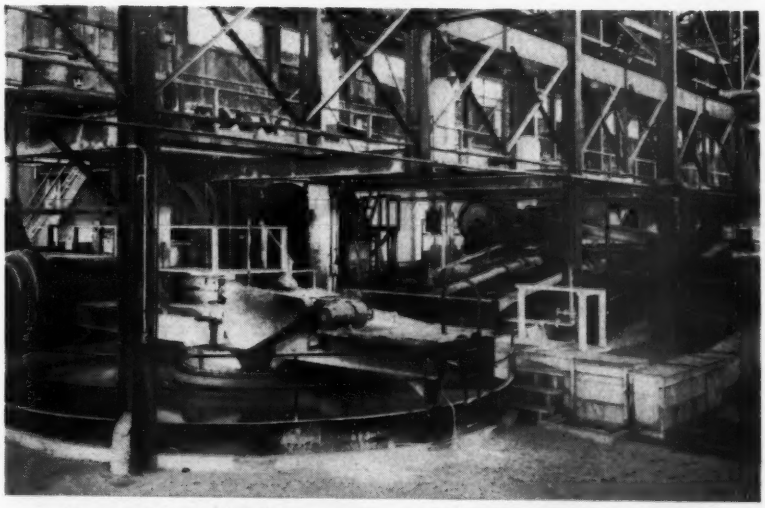
Intermediate Crushing

In treating the Ray Mines pit ores, which contain a large percentage of diabase and other ores that are difficult to crush and grind, there is a marked advantage in employing the 10½ by 14-ft ball mill in an intermediate stage of crushing and grinding. In present operations these mills are charged with 3-in. balls and are operated at 14.33 rpm. The mills are lined with 3-in. thick Lorain shell liners with 20 lifter bars projecting 2½ in. beyond the shell liner. Since these mills have been in operation, shell liners have shown only slight wear and it is estimated they will have a wearing life of between six and seven years. With the operation of the mills at relatively low speed, where the flow of the cascading balls cuts a bath across the end liners below the axis of the mill, it was found that throat liners were subjected to the greatest rate of wear and that it was necessary to install heavier liners. Development of heavier throat liners led to installing supplementary rail liners in the trunnions and also installing a truncated conical trommel in the discharge trunnion in order to retain the balls. This trommel functions exceptionally well in retaining the balls and has shown practically no tendency to clog. In spite of the fact it is made of ¼-in. thick mild steel punched plate, the rate of wear is surprisingly low. The trommel is light and easily removed, affording ready access to the interior of the mill for inspection.

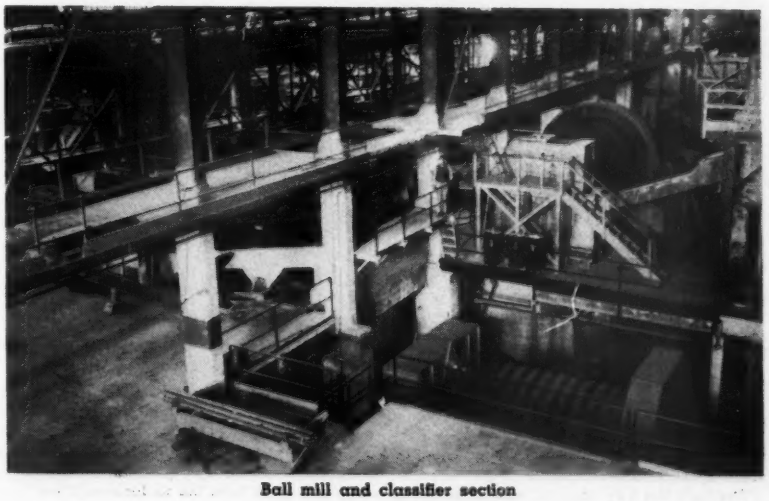
No important changes have been made in the 7 by 10-ft ball mill classifier installations, except to substitute wave type cast liners for rail type liners in certain mills. This change



Rougher flotation cells



Because of large classifying capacity, no thickening is required ahead of flotation



Ball mill and classifier section

is being made as the rail liners wear out, chiefly to reduce the time required to re-line the mills and also to apply additional power to a newly-lined mill. The 7 by 10-ft ball mills are charged with 2-in. cast balls and operated at 16⅔ rpm. If a three-stage reduction flow sheet is standardized on, the grinding capacity the mills would be increased by employing smaller balls.

No Thickening Needed

Because of a large classifying capacity no thickening is required ahead of flotation. This is important as regards taking advantage of the lime conditioning treatment in the grinding circuit.

Addition of lime to the crude ore at the primary elevators ahead of the rod mills is necessary to protect the elevators and mills against corrosive action of copper sulphate contained in the ore. The amount of lime applied at this point is only sufficient to maintain positive alkalinity in this stage of operation, because a higher degree of alkalinity has a tendency to depress slimed (sooty) chalcocite contained in the primary slime portion of the ore. The primary slimes removed by overflowing the 24-ft bowl classifier will yield a bulk flotation concentrate of relatively high grade copper because most of the pyrite is removed with the classifier sand. The sand product from the 24-ft bowl classiler, which is fed to the 10½ by 14-ft ball mills, is substantially free of sooty chalcocite but contains most of the coarse granular sulphides. When an excessive amount of pyrite is present, a high concentration is developed in the ball mill classiler circuits. This permits selective grinding of the sulphide minerals to liberate chalcocite from the pyrite and also permits subjecting free pyrite to a relatively high degree of lime alkalinity to depress its flotability without interfering with optimum conditions in other stages of the milling operation. The degree of flotability of free pyrite is controlled by the degree of alkalinity carried in the ball mills. By maintaining a sufficient degree of lime alkalinity in the ball mills to depress the flotability of free pyrite the flotation time required to recover the chalcocite is reduced. Points to add lime, and the degree of alkalinity in various parts of the circuits are considered very important in local operations.

Flotation collecting and frothing agents are added to the combined feed going to the primary pump sump prior to being pumped to flotation. Advantage is taken of the agitation afforded by the pumps and the time of contact during pumping to pre-condition the pulp for flotation. A rougher concentrate from the upper half of the Callow type cells is pumped to 56-in. Fagergren cells from primary cleaning. The rougher concentrate from the lower half Callow type cells is returned to the primary pump sump in closed circuit with the roughing operation. The tailing from the 56-in. Fagergren primary cleaning cells is also returned to the primary pump sump. The 56-in. cells are operated to produce a low grade concentrate containing a large portion of the middling grains. This concentrate is subjected to two stages of cleaning in 44-in. Fagergren cells to produce a final concentrate and a cleaner tailing containing these middling grains. This cleaner tailings, which averages approximately 6.2 percent copper, 15.5 percent iron and 56.9 percent insoluble, is thickened to approximately 35 percent solids and fed to one of the regular 7 by 10-ft ball mills in conjunction with 50 percent of the normal amount of sands from one of the 18-ft bowl classifiers. This sand material facilitates grinding of the thickened middling product and also prevents over-grinding of the relatively finer material. The reground product is returned to the rougher flotation cells with the original feed.

Up-Grade Concentrates

Regrinding only the lean portion of the rougher concentrate (cleaner tailings which contains middling grains of associated minerals) is considered a very important step in local milling operations, as it has resulted in an over-all recovery of copper and also permits a substantial grading-up of the concentrate without subjecting the higher grade portion of the concentrate to regrind. According to local experience, regrinding of the total rougher concentrate results in a substantial loss of copper, due to sliming the chalcocite and certain adhering oxides.

The finished concentrate is pumped to the dewatering plant where it is sampled, thickened and filtered. Due to the character of the concentrate one 12 by 12-ft Oliver Filter has proven sufficient to take care of current production and at times has handled over 700 tpd. The filtered concentrate which averages approximately eight percent moisture is loaded directly into bottom dump cars for shipment to the Hayden Smelter.

Tailings Disposal

The tailings are fed by gravity to the 900-acre tailings disposal area. At present this area is divided into three ponds which are used alternately. After one area is filled the ground is permitted to dry out sufficiently for dike construction. Of the various equipment employed for dike construction, the caterpillar-type bulldozer has proven to be by far the most satisfactory. New dikes are constructed to an elevation of nine ft above the level of the pond and during this construction the material is packed firmly by the tractor. Overflow boxes are installed in the dikes to discharge the clear water, and gates are provided to increase the level of the overflow as the pond is being filled. Because of an ample supply of primary water, no tailings water is returned to the mill. Due to the proximity of the Gila River to the tailings disposal area it is necessary to do a considerable amount of river control work in order to protect the tailings.

Ore from the Ray open pit mine is harder to crush and grind than the underground ore

Tomorrow's supervisors are being readied in today's training programs

Engineer Selection and Training

Outstanding Engineer Training Program Provides Qualified Men for Responsible Posts in Large Mining Company.

By WILLIAM C. NELSON
Assistant to the President
and
JOHN J. YORKE
Personnel Officer
Island Creek Coal Co.

THE Engineer Training Program of the Island Creek Coal Co. and its affiliated companies was initiated in 1946 to overcome the need for supervisory manpower created by expansion of the company's production facilities and the lack of trained men during the war period.

The problem caused by the lack of competent supervisors had been laid before the mine superintendents and managers and their recommendation was a recruitment program at engineering colleges and schools of mines and the initiation of an intensive training program.

Island Creek had had some experience in employing college graduates just before the war, but there had been no formal, accelerated training program as was considered necessary in 1946, for these men.

The program and the practices developed in 1946 continue to stick to original program with some minor changes. The plan outlined then, despite the fact that conditions were different then than they are now, has worked fairly well.

Development of the program was turned over to a member of the staff of the vice-president of operations, who consulted with mine superintendents and managers, and provided for the following major steps:

(1) Selection methods and recruitment procedure.

(2) Supervision of program.

(3) Content of training program.

(4) Follow-up on trainee assignments.

(5) Appraisal of performance of trainees.

(6) Post training assignments.

Development work resulted in the following:

(1) A pamphlet describing the program was prepared and distributed to mining colleges.

(2) A training program manual was prepared for distribution to trainees and company executives including those supervisors who have trainees assigned to their departments. It covered general information on the program; what each trainee is expected to learn in each department; length of time in department; pay basis; and shift to be worked.

(3) An interview form for use by the company representative visiting the campus.

(4) The appointment of a Management Training Coordinator (part time job).

(5) An appraisal report to be completed by the Mine Superintendents or foreman to whom the trainee is assigned.

(6) Form of report to be made periodically by the trainee.

Recruit Often

The management training coordinator or another member of the Industrial Relations Department visits the campus of the various mining schools in the area several times a year. He arranges his visits with the Placement Office of the university or with

Experience with the Engineer Corps gives future production men an insight into mine planning and its problems

the head of the Mining Department, depending on the practice at each particular school. An attempt is made to get all men who are interested in the program together at a group session so that the interviewer can outline the complete training program and answer general questions. This meeting is followed by individual interviews which last from 20 to 30 min each.

A record is made of the individual interviews and a completed application form is secured from each man. While at the university, the company representative secures comments from the applicant's instructors and professors, his academic standing and extra-curricular activities, in addition to his work experience prior to going to college and his army or navy experience, in the event the man is a veteran. No job offers are made at this time.

Men who are selected by the company representative as having the best potential are offered a trip at company expense to the company's properties. In the event the man is married, his wife is invited to accompany him.

When the applicant comes to the properties, he is interviewed by the general manager or manager of the property, the director of Industrial Relations, the director of Industrial Engineering, and a division superintendent. Each of these men makes a report on the young engineer, together with a recommendation for employment or rejection. While the man is visiting the property, he is given a battery of tests which are interpreted by the Industrial Relations Department and used in varifying impressions received in the interviews.

While company representatives visit a limited number of campuses, applications are also received from men being graduated from engineering schools not visited. If, after receiving a completed application from the applicant, it appears he is a good prospect, he is invited to visit the company for a series of interviews and from that point on he is handled as outlined above.

Training Program

The training program for men with little or no experience takes two years. It provides for actual work experience in the mines and shops, assignments in the several staff departments, and includes conferences covering com-

INTERVIEWER'S REPORT Permanent_____ Summer_____

Name_____ Date_____

2. Course: Mining____ Elect. ____ Mech.____ Other_____

3. Graduates_____ 4. Academic Standing_____

5. Familiar with coal mining? Yes ___ No ___ Explain:_____

6. Kind of job interested in _____

APPRAISAL OF PERSONALITY

	Excellent	Good	Fair	Below Average	Poor
7. General first impression					
8. Personal appearance					
9. Energy					
10. Initiative in conversation					
11. Aggressiveness					
12. Does he show promise					
13. Final impression					

14. PERSONALITY (Check more than one)

___ Dominant ___ Quiet
___ Strong ___ Affable
___ Passive ___ Commonplace
___ Negative ___ Colorless

15. POISE AND MANNER

___ Excellent ___ Overbearing
___ Good ___ Confident
___ Pleasing ___ Ordinary
___ Poor ___ Awkward

16. MATURITY ___ Unusual ___ Normal ___ Insufficient

ANY PROBLEMS WITH RESPECT TO EMPLOYMENT?
(Family, location, ability, housing, further education)

Recommend Employment Yes ___ No___ Interviewer_____

ADDITIONAL COMMENTS

Sports_____

College Earnings_____

College Offices Held_____

Honors_____

Fraternity_____

Family Data_____

FURTHER COMMENTS ON PERSONALITY

APPEARANCE:

Physique ___Tall ___Medium ___ Short ___Fat ___ Regular ___ Thin___
Facial Looks ___ Good ___ Fair ___ Poor
Eyes ___ Keen ___ Steady ___ Weak ___ Shifty
Skin ___ Clear ___ Mottled
Clothes ___ Good ___ Fair ___ Slovenly ___ Overdressed
Posture ___ Unusually erect ___ Normal ___ Stooped
Other _____

SPEECH:

Describe Impediments (Stammering, Queer voice, deafness) _____

Vocabulary ___ Good ___ Average ___ Limited
Accent ___ Mid-western ___ Southern ___ Eastern ___ Foreign
Expressions ___ Well chosen ___ Good ___ Common place ___ Trite
___ Colloquial

Delivery ___ Rapid ___ Smooth ___ Normal ___ Deliberate
___ Hesitant ___ Loquacious

pany history and organization, company policies, union contracts, safety rules and regulations, first aid, and other programs which are offered to management personnel from time to time.

While the program provides for two years' practical work, the experience and background of each man is considered in making work assignments. For example: if the man has had a substantial amount of experience with mobile trackless equipment, he is assigned work with face conveyor equipment and with track mounted equipment. In addition, he will be assigned work with main-line track crews, haulage crews, and supply crews. Some of the men have had sufficient experience so that their training schedule can be reduced by as much as a year. In short, the training program is very flexible and is used as a means of orientation and indoctrination to the

Education and directed experience are a hard-to-beat combination

trainee and provides management with an opportunity to evaluate the individual before making permanent assignments.

Conference sessions are led by the company executives best qualified to discuss the subject assigned. These conferences are supplemented by dinner meetings, after which talks are given by department heads and other executive personnel. Trainees are also extended membership in the management clubs at the several properties, and they attend monthly meetings throughout the year. These latter two types of meetings give the trainees an opportunity to become acquainted with all management personnel.

In addition to the more formal types of meetings, "bull sessions" are held periodically, at which time the trainees discuss with the management training coordinator anything they have on their minds. They include any personal problems, problems at the mines, type of work they are doing, suggestions for cost savings, recreational activities, and suggestions for revising the training program. These informal sessions have proved a valuable asset.

Make Reports

Every three months, or each time a trainee is transferred from one job to another, he makes a report to the management training coordinator on his experiences since his last report. The outline of the report is as follows:

(1) Period covered
(2) Department or mine
(3) Work assigned and performed
(4) Supervision and treatment received
(5) Constructive criticisms and suggestions for improvement of methods, equipment, training and/or administration of the operation
(6) Signature

At the same time, the superintendent or foreman for whom the man has been working makes an appraisal report on the trainee. This appraisal is used to make sure that money and time is not spent on a man who does not have future development possibilities. Any weaknesses reported are discussed with the trainee together with suggestions for improvement. After three adverse reports, the trainee is requested to resign.

Merit Increases Paid

Since the trainee is working on jobs covered by the union contract, he is required to join the union. However, because these men are considered a part of management, the company has established a minimum salary guarantee during training. In the event he does not work enough in a month

ENGINEER TRAINEE PROGRESS REPORT

Period covered _____ to _____

Name _____ Days worked _____

Location (Mine, section, location) _____

_____

Refer to outline in Training Program pamphlet in making this report

Work done _____

_____

_____

_____

_____

_____

Did work done conform with Training Program? _____

_____

What items in Training Program did he not cover? _____

_____

Comments on work done _____

_____

_____

_____

Describe his attitude toward (a) company, (b) supervisors, and

(c) fellow workers _____

_____

_____

How does he compare with other trainees? _____

_____

What specific faults did he have? _____

_____

Should he continue in training? _____

Reason _____

Person making report _____

5-15-50

to earn his minimum for reasons beyond his control, supplemental payments are made to bring him up to the minimum monthly salary. During the time that he is doing work not covered by the union contract, he is paid on a salary basis. Merit increases are given from time to time during the training program.

No guarantee is made to the trainee regarding the position and location to which he will be assigned after his training program is completed. For men headed toward production, the initial assignment is in the Industrial Engineering Department. They remain here until they have the required experience to become certified mine foremen. In this dpartment duties consist in making operations studies, time studies of face operations, section inspections, studies of haulage problems, and other industrial engineering assignments. Other mining engineer graduates are assigned to surveying and drafting work in the Engineering Department. Electrical and mechanical engineers are assigned to mine equipment maintenance work in the shops, to design work in the Engineering Department and to power distribution work in the Electrical Department.

If the trainee has had sufficient experience to obtain his state mine foreman papers and become certified, he may be assigned as a section foreman immediately on completing his training program.

In any event, each successful trainee is offered a permanent assignment by a superintendent or department head and is not assigned a position arbitrarily.

TRAINING OUTLINE

Face Work and Other Mine Experience Mine Superintendent and Section Boss

Time: Mining Engineers—Six months
Electrical and Mechanical Engineers—Three months

Pay Basis: Union rates for job performed.

Usual Shift: Day, if possible; night if necessary

Face Operations

Work assignments will be varied and will include every job it is feasible for the trainee to do. Trainee will be assigned to section bosses who like to handle young men, and who are able to answer questions and to explain the work fully. In addition to the specific work assignments, trainees will learn as much as possible about:

1. Mining system used in each mine and why used.
2. Major production problems at each mine.
3. Local customs at each mine that differ from other mines.
4. Mining laws and company safety rules.
5. Fire Bosses report—their preparation and use. Should make several runs with Fire Boss.
6. Section Foreman's daily reports—their preparation and use.
7. Ventilation system. How to check flow of air. Different ways of conducting the air through the mine, overcasts, doors, stoppings. Line Brattice. Splits and reasons for split. How to read an Anemometer. Necessity and use of Water Gauge. Safety Lamps. How to test for gas.
8. Testing roof (sight, sound, and vibrations, ribs). The timbering system. Roof Bolting. Roof action under different conditions.
9. Storage and handling of Explosives—shooting and precautions necessary.
10. Correct use of spade (more of this under Engineering).
11. Operation sequence, how to overcome bottlenecks.
12. How track is laid; importance of correct alignment, proper bolting, and bonding.
13. Installation of and checking of power lines, testing for adequate power.
14. Importance of checking first aid material and fire extinguishers daily.
15. Operating characteristics of all equipment—correct operation procedure—common abuses to each.
16. How to leave a section for the next man.
17. Supervisory techniques—how men are assigned work, handling of discipline and reprimands, teaching of men new work; trainees should note effectiveness of various methods.
18. If possible, some instruction through observation of how labor relations problems are handled.

Auxiliary Operations

1. Trainees should work a week with the Supply Foreman and learn supply requisitioning procedure and supply handling procedure.
2. Time keeping procedure.
3. Getting new sections ready to start.
4. Mainline work.
5. Emergency organization.
6. Outside operations—sandhouse, blacksmithing, etc.
7. Rockdusting and use of calcium chloride for shuttle car haulways.
8. Drainage.
9. Mainline Haulage.

Under-Graduate Training Program

Complementing the graduate engineer training program is Island Creek's practice of employing undergraduates for work both inside and outside the mines during summer vacations. Top management is most enthusiastic about this program because it gives a chance to observe the man as he is performing his assigned duties, and at the end of his four years in college, a more intelligent selection of graduates can be made for the regular graduate training program. In addition, it is felt that undergraduates who have actual work experience in mines will find their college courses much more meaningful and valuable.

Appraisal reports are made on summer student employes similar to those in the graduate program. These reports serve as a guide in determining whether or not to reemploy the student during the following summer.

Results Excellent

Results to date of the Engineer Trainee Program have been entirely satisfactory. Since starting the program in 1946, 40 graduates of the training program have been permanently employed. Typical assignments of these various men at present are as follows:

Assistant General Mine Foreman
Section Foreman
Mine Superintendent
Superintendent, Equipment Rebuilding Shop
Division Industrial Engineer
Preparation Engineer
Electrical Design Engineer, Engineering Dept.
Assistant Master Mechanic
Mechanical Design Engineer
Mining Engineer

There have been some losses from the program but some attrition was inevitable. In only three cases was it necessary to discharge men because they were unsatisfactory. Three men resigned to go into other industries, and one went to another coal mining company. One was recalled to active duty in the army. Eighty percent of these men are still with the company and all who have completed their training are employed in supervisory or technical engineering positions and are performing satisfactorily.

Outlook for the Future

Virginia Polytechnic Institute has just announced a cooperative engineering program which will include three types of engineering training in which Island Creek is interested; namely, mining, electrical, and mechanical. The plan of education provides that the student will attend classes on the campus for three months and then

(*Continued on page* 135)

The empty bucket is ready to be returned to the shaft bottom

Inclined Shaft Sinking

By F. W. SAUERWEIN
Mine Engineer, Sterling Mine
New Jersey Zinc Co.

THE northward extension in depth of the Sterling Orebody required the driving of an auxiliary underground shaft. Sinking of the lower portion of this inclined shaft led to the development of a mechanical mucking method that proved itself beyond expectations.

The North Orebody shaft is a three compartment, 52° slope of 8 by 18-ft cross section, extending 1045 ft below the 1850 level. Its ore production will be transferred on the 1850 level to the main shaft located approximately 1200 ft to the south.

An initial prospect winze had originally been sunk to the 2450 level from which intermediate level development was carried on prior to location of the production shaft. Consequently, the shaft above the 2450 level was excavated by means of raising and shrinkage stripping, the broken rock being drawn to lower levels and hoisted through the prospect winze. The remaining portion of the shaft had to be excavated by sinking 280 ft below the 2450 level.

Inexperienced crew, with home-made mucking machine, average 1.97 ft per shift sinking 8 by 18-ft inclined shaft

Rule Out Hand Shoveling

When considering the mucking phase of the sinking operation, hand shoveling was rejected as undesirable because of the cost, time involved and the disinclination of current labor to perform arduous work. Attention was therefore given to the development of a practical mechanical device for removal of broken material.

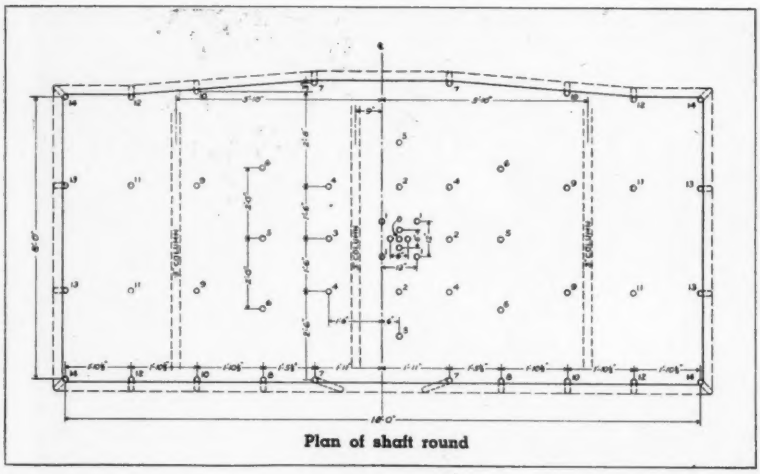
The 52° pitch of the shaft ruled out any application of scraper and slide loading directly to a skip, while the limited shaft dimensions made difficult the use of scraper and loading pan or bucket. Consideration was given to an inclined shaft mucker embodying the principle of an undercutting shovel bucket, and to a recently publicized machine with a bucket operating in a manner similar to a clamshell. In the operation of these muckers it was felt that the necessity for hoisting each bucketful to the dumping point through a distance of over 1000 ft, or intermediate muck transfer, was a definite disadvantage. Another deterrent was the fact that the small amount of sinking involved did not warrant the purchase or fabrication of such equipment.

Foreman Develops Machine

The mucking method that finally evolved was the outgrowth of an idea developed by C. J. Mackey, shaft foreman, with the collaboration of the engineering department. It used the principle of a dragline bucket. It was believed that a properly designed bucket, open at the front only, could be filled to a greater or lesser degree by pulling it along the muck pile, but there was considerable doubt as to the number of passes required to fill it efficiently.

Accordingly, a toothed lip bucket was designed and constructed in the shops at minor expense and operated experimentally on the muck pile produced by initial sinking at the 2450 level. The 13-cu ft bucket is 18 in. high by 30 in. wide with top and bottom lengths of 3 ft 6 in. and 4 ft 0 in., respectively. Pull and tail ropes are hooked to either end, and the bucket is hoisted through a stationary sheave located at the front.

From the first trial runs it was evident that the bucket could be filled efficiently in one or two passes most of the time. With the exception of a counterweight added to the rear to prevent overturning, no major alterations to the original design were re-



Plan of shaft round

quired. A 20 ft long sinking cage consisting of a wheeled chassis containing three built-in steel platforms was constructed. Three air driven hoists were mounted on the platforms; a single drum at the upper and lower platforms and a double drum at the center.

Use Two Sets of Tracks

When operating, the cage is positioned on the 42-in. gauge shaft track in the center compartment and 10 to 30 ft above the muck pile, depending on the cycle. The regular 50-cu ft ore skip operates on the second track and is placed so that its top is level with the lower end of the cage. All cables from the hoists pass through rope blocks hung from pins secured in the shaft hanging wall directly above the lower end of the cage. Once the positions of these blocks had been established, by trial and error, it was a simple matter to repeat the same positions in relation to the cage as sinking progressed.

Ropes from the double drum hoist, after passing through the hanging wall blocks, continue down to blocks located at either side of the shaft a few feet above the muck pile, the pull rope to one, the tail rope to the other, thence to the front and rear of the bucket. As the muck pile recedes, the blocks at the shaft sides are lowered—not more than twice during the mucking cycle, however.

Cable from the upper hoist, after passing through the hanging wall block and the sheave at the front end of the bucket, is dead-ended to a pin in the hanging wall adjacent to the rope blocks.

Loading Operation

To load, the bucket is pulled through the muck pile until filled, then pull and tail ropes are disconnected by means of open hook attachments, and the upper single drum hoist raises the bucket to the dumping position.

Scraping along the muck pile, the bucket picks up its load

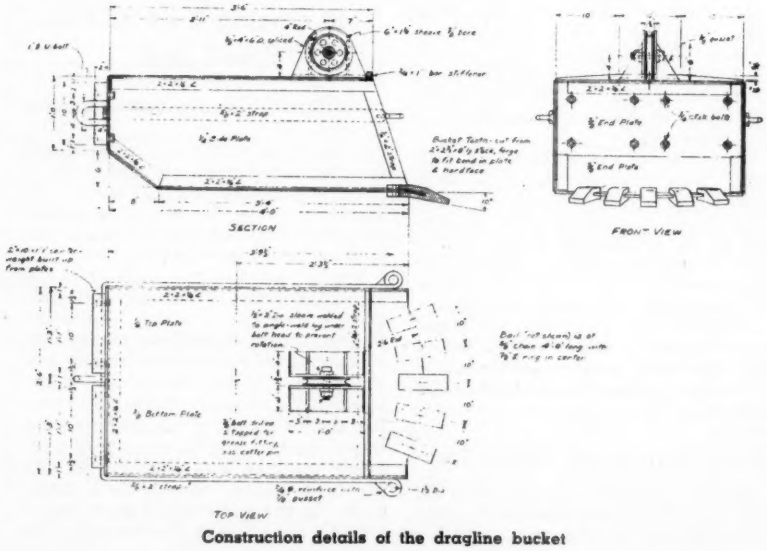
The cable from the lower hoist, passing through one of the overhead blocks, is then hooked to the rear of the bucket, while a fixed chain, suspended over the skip, is attached to the bail. With proper manipulation by the operators of the upper and lower hoists, the lip of the bucket is lowered to rest on the edge of the skip, the bottom is raised and the muck discharged into the skip without spillage.

During the mucking cycle, cage stability is insured by means of a small demountable screw jack braced against the hanging wall, while the upper end of the cage is pinned to the footwall.

It was found that three or four shaft rounds could be mucked from the same set-up before bucket hoisting distance became excessive. When the mucker location had to be changed, extending shaft track was relatively simple. During sinking, the 60-lb shaft track was temporarily carried on 6 by 6-in. stringers pinned to the footwall to provide a maximum of headroom for skip loading. Track extensions, made up of 30-ft rails tied together with angle spreaders and having detachable beveled points bolted to the upper ends, rested immediately on top of the temporary track in both compartments. These extensions were lowered as needed for cage and skip positioning and when 30 ft of advance was made, the beveled points were unbolted, the 30-ft rails dropped into place, and additional rail lengths brought down to serve as new extensions.

Work by Contract

After an initial advance of 48 ft, during which sinking was performed on a trial basis, the work was placed on contract in September 1950, two shifts per day, five days per week. The shaft was sunk through meta-



Construction details of the dragline bucket

Skip loading is not as difficult as it appears

morphosed limestone requiring no immediate timbering. A total of 14 men were employed; six shaft men and a hoisting engineer on each crew, plus two extra men on the day shift for miscellaneous jobs in connection with track installation, maintenance of equipment and procurement of tools and supplies.

During the drilling period, three hand-fed sinker type machines mounted on 3-in. columns were employed, requiring the services of the six shaft men. A 55-hole shatter cut round was drilled with three steel changes and blasted with 40 percent semi-gelatin dynamite and standard electric delays. When mucking, three men operated the sinking cage hoists while the remaining three attended the bucket operation at the shaft bottom.

The 14 men participated in an incentive plan in which a bonus per foot was paid on all advance over 50 ft during a 20-day period. Participants shared as follows: shaft men, 100 percent, hoisting engineers, 50 percent, and the utility men, 25 percent.

In December 1950, at the conclusion of three 20-day contract periods, the shaft was bottomed 284 ft below the 2450 level. During the contract periods advance per round averaged 7.15 ft, while advance per shift averaged 1.97 ft. Advances for the three periods were 73, 76 and 87 ft, respectively. Had additional sinking been required, it seems probable that 20-day advances of 100 ft or more could have been achieved as technique improved.

Crew All Inexperienced

It should be noted that of the men composing the sinking crew, none had any previous shaft sinking experience. In a short time the hoist operators on the sinking cage learned to manipulate the bucket so adroitly that not only could it be filled completely, but it could be made to scrape out the muck from beneath the tail rope block pinned to the end wall. It was so effectively operated that in the final clean-up of the round, never more than two drag buckets required hand loading.

In the mucking cycle four buckets were required to fill each skip and the record attained in one shift of seven actual working hours was 46 skips, approximately 2200 cu ft of muck, or one skip every nine min. This entailed hoisting 184 buckets at slightly over two min per bucket. Experience indicated that insofar as the mucking cycle was concerned, five, or even four, men would have been sufficient since on several occasions the absence of one man from the crew caused no appreciable loss of efficiency.

Performance of this shaft mucker fully measured up to variations of coarse and fine muck and since the ordinary materials found about the plant were utilized in its construction, the equipment cost was small. Maintenance was negligible and no breakdowns occurred, although a spare dragline bucket was kept on hand and interchanged for minor repairs.

Don't "Overshoe" Your Crawler Tractor*

IT'S mighty important to adapt the track shoe size of your crawler tractor to the job conditions. In other words, don't "overshoe" your tractor. Track shoes that are too wide for the kind of work or for the job conditions cut down the track life, maneuverability, and speed of your crawler. When the track shoes are too big, your crawler literally "drags its feet" on the job.

Selecting track shoes for a range of operating conditions involves three main factors to be considered. They are (1) flotation, (2) pull-bracing grouser area, and (3) track-wear life.

"Ground pressure" is usually the measure of flotation. An easy way to determine ground pressure is by dividing the tractor's weight in pounds by the number of square inches of track area resting on the ground. You figure the track area on the ground by doubling the track shoe width and multiplying that figure by the distance in inches between the center lines of the drive sprocket and the front idler.

Sometimes, especially when flotation is overemphasized, such wide shoes are used that the weight of the tractor isn't enough to push the grousers into the ground to their full depth. This cuts down the area of the grousers which actually penetrate the ground and help pull the tractor along—usually known as "pull-bracing grouser area." The results are that a large amount of pull-bracing grouser area is lost, the rolling resistance is increased, and track wear becomes greater because unnecessary leverage loads are imposed.

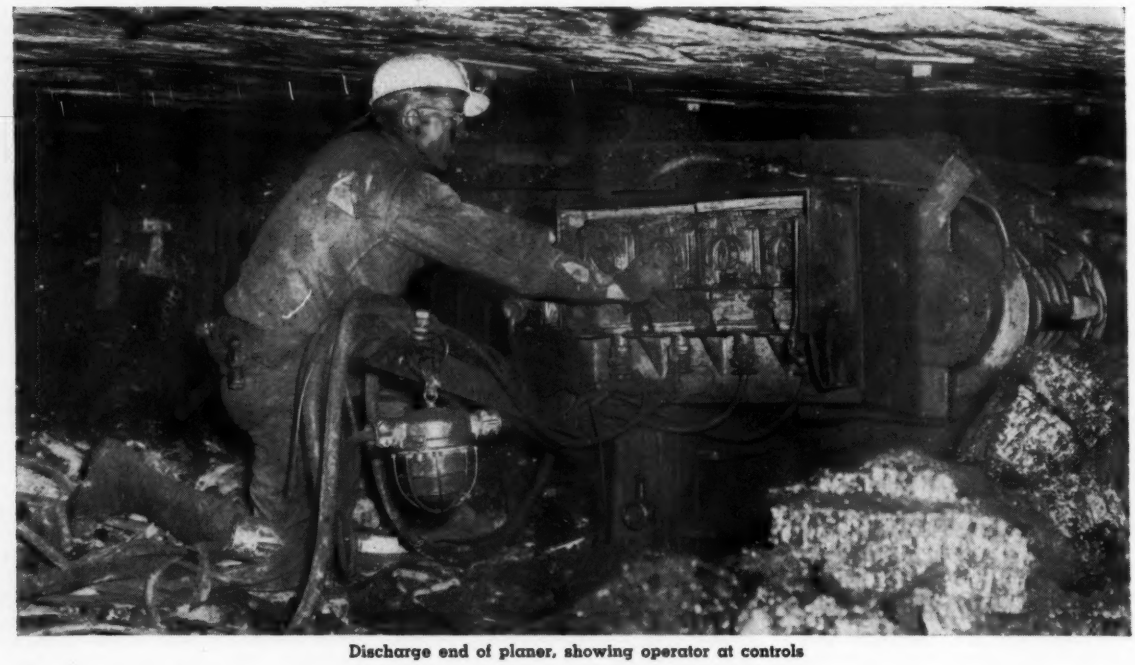
Another factor to consider is wear and tear on the drive train of a tractor that is "wearing" shoes too big for the job conditions. When the shoes are so wide that the tracks will not slip under overloads in first gear, the drive train must take a lot of punishment from shock loads. Operators feel that the tractor lacks power.

On the other hand, if the shoes slip in first gear under heavy load, they prevent overloading and encourage the operator to take slightly smaller loads at higher speeds. Usually this practice increases work capacity and definitely reduces down time and maintenance costs.

All these effects which often take place with wide track shoes mean increase rolling resistance and shorter track life.

So don't overshoe your crawler tractor. While there are many applications where wide track shoes are necessary and desirable, you will find that most jobs are better done with recommended-width track shoes so that you get the maximum horsepower you pay for. You will get the benefits of less down time, longer track life, and, most important of all, better maneuverability, faster time cycles, and more work done at less cost.

* By E. A. Braker, Supervisor, Industrial Power Sales Engineering, International Harvester Co.



Discharge end of planer, showing operator at controls

Mining With a German Coal Planer*

Use of New Machine Enables Recovery to be Increased Five Percent and Production to Jump From 10.4 Tons to 12.3 Tons Per Man-shift

THIS experiment conducted in Stotesbury Mine of Eastern Gas & Fuel Associates in southern West Virginia, was the first application of mining coal with a German coal planer (plow) on a longwall face in the United States. A block of coal 1441 ft long, 328 ft wide, and 34 in. thick was mined completely in 93 shifts. The total production was 51,450 tons of clean coal. Average production per shift for the entire period was 553 tons of clean coal, although the average production for 15 consecutive days at peak production was 694 tons. Maximum production for one shift was 800 tons of clean coal. During the 15 consecutive days of peak production the crew averaged 33.3 men on the first shift and 4.5 men on the second shift, a total of 37.8 man-shifts per day, and production averaged 18.4 tons of clean coal per man-shift. For the entire operation the average production was 17.1 tons of clean coal per man-shift.

Except in the entry development, the use of explosives was eliminated. Roof control and action throughout the experiment were highly satisfactory. The primary roof supports during mining were adjustable yielding steel props supporting steel beams, and the auxiliary supports were wood cribs. Wood cribs with crib chocks used as primary support and steel props as auxiliary support might permit easier recovery of jacks, particularly when water softens the stratum underlying the coal bed.

The mine operates the Pocahontas No. 4 seam. This coal is low-volatile bituminous, very friable, and parts freely from both the shale roof and clay bottom. The bed is generally flat-lying but rolls gently in places. In the area where the experiment was conducted bed thickness ranged from 31 to 36 in. and averaged 34 in., all of which is mined. A soft clay parting, usually one in. or less thick occurs near the middle of the bed. Bone coal two to three in. thick occurs about two in. from the bottom of the coal bed, and a band one to two in. thick sometimes is found near the top of the bed.

Coal is overlain by four ft of shale. However, in some areas, a weaker stratum of shale three to five in. thick separates the coal and the shale. Over the shale is 2½ ft of sandstone, which is overlain by 43 ft of sandy shale. The remaining overburden consists of thin coal beds, sandstone, shaly sandstone, and shale strata of various thicknesses. Thickness of cover over the experimental area ranges from less than 100 ft to about 300 ft. The coal is underlain by fire clay.

Development of Longwall Face

A block of coal 328 ft wide and 1745 ft long was developed by driving two parallel sets of three entries and connecting the sets of entries with two parallel rooms at the inby end. Hand-loaded conveyors were used for this work. Each succeeding adjacent panel could be developed with only three entries and the parallel connecting rooms at the inby end. In conformance with standard practice at the mine, the outlay 290 ft of solid coal was to be left as a main-entry barrier pillar.

The panel entry adjacent to the inby side of the block was driven 21 ft wide, with roof bolts two ft long,

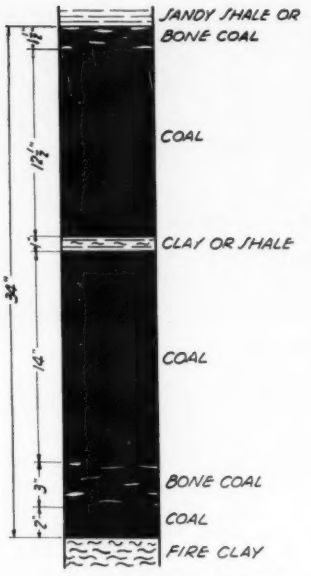
* An abstract of a U. S. Bureau of Mines Report of Investigation 4922, Modified Longwall Mining With A German Coal Planer (Plow) in the Pocahontas No. 4 Coal Bed, Helen, W. Va., by Wilbur A. Haley, James J. Dowd and Louis A. Turnbull.

spaced four ft apart in both directions. An area 11 ft wide along the chain pillar rib of this entry was bottom-brushed to provide four ft of headroom. Coal is transported from face conveyors to main-line haulage by a belt conveyor installed in the brushed part of the entry about four ft from the chain-pillar rib. Other entries were driven 18 ft wide but were not bottom-brushed nor was the roof bolted. The two rooms at the inby end of the panel were driven 18 ft wide. To provide added working space and a straight coal face, the room adjacent to the end of the experimental block was widened to 30 ft by mining two six-ft cuts off the end of the experimental block.

Planer Operation

The coal-planer unit is a continuous-mining machine that mines coal from a solid face and loads with a plowing action onto the face conveyor. The planer (or plow) travels at a speed of 75 fpm and operates in either direction. In this experiment the face conveyor discharged the coal onto a standard American chain conveyor, laid in the panel entry, which end-loaded onto the panel belt conveyor. The coal face was retreated at least three in. each time the planer moved in either direction along the 328-ft face. When mining was begun, the height of the planer cut was 19½ in.; this height was increased later to 25½ in. Remaining coal broke and fell into the conveyor or along the coal face under roof pressure and its own weight. The width of top coal hanging at any one place depended chiefly on the roof pressure at the time and ranged from a few inches to as much as four ft. On occasions, the top coal had to be wedged down or loosened with pneumatic picks. However, for the most part, the top coal parted freely from the roof and was no problem.

Framework for the machine is made of heavy steel sections bolted together which can be added or removed to increase or decrease the planer height. The planer is equipped with four knives on each cutting face, a single knife seated vertically at the top of the frame, and two bottom knives. Shanks of the knives are inserted in holes in the planer frame and secured with set screws. Planer sections rest on a platform base, about five ft long. Two steel arms or plates extend from the platform base under the face conveyor. These arms lift the conveyor one to two in. off the mine floor at and near the point of contact and in so doing, easily permit the conveyor to be pushed a few inches from the face by the moving planer and to be pushed back against the face by the pneumatic shifters after the planer has passed. An endless towing chain attached to each end of the planer base extends from one end of the planer



Typical section of coal bed

around a sprocket at one drive unit, through the return duct and around a sprocket at the other drive unit, and then to the other end of the planer. The chain, which is constructed of ⅞-in. steel, has a breaking strength rated at 50 tons. However, a load-limiting pin, inserted in a key slot on the shaft of each drive sprocket, shears under a pulling force exceeding 20 tons. The chain comprises 26-ft sections, which are connected with locking links that permit replacement of chain sections.

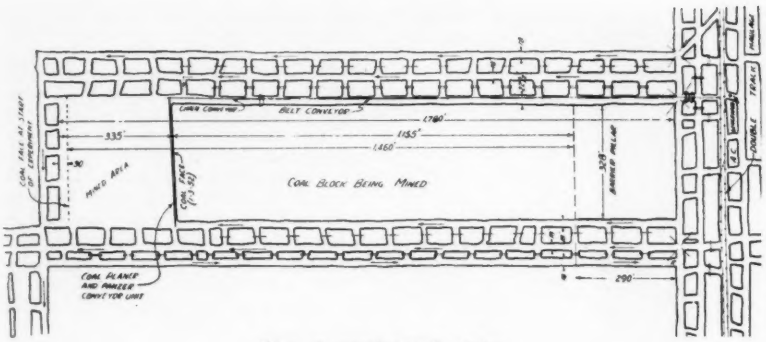
Planer Equipment

The complete unit includes an armored double-chain conveyor which rests on the mine floor and extends the entire length of the longwall face; a drive unit and controls at the discharge end of the conveyor; a drive unit at the opposite end of the conveyor; the planer assembly; and 17 pneumatic shifters. Conveyor sections, each 59 in. long, are fastened together with flexible bolted couplings, which permit the conveyor to operate on a moderately uneven mine floor as well as along an uneven coal face. At each coupling the conveyor can be flexed in either direction as much as 5° from a straight line. A section of 3½ in. steel tube is attached to the face side of each conveyor pan. This tube is used as a return duct for the planer towing chain and as a guide for the planer.

The gob side of the conveyor is equipped with spill plates to which is attached steel conduit for power cables, face-light cables, control cable, and telephone circuit. Face lights spaced 20 ft apart are also mounted on the gob side of the conveyor. In addition to face illumination, the lights provide a signal system for controlling the planer operation. By pushing a button, signals can originate at any light or at the operating controls. A two-in. steel compressed-air line in 10-ft lengths, equipped with flexible couplings, also is attached to the gob side of the conveyor. Valves, to which air hose can be attached, are installed in the air line at convenient intervals. These valves are opened and closed automatically upon attaching or detaching the air hose. The air line conducts compressed air to the pneumatic shifters, to compressed-air-operated picks, and to an air-operated clutch in each of the drive units.

The assembled conveyor has an overall width of about 48 in. Plates on the gob side, to prevent spillage, extend nine in. above the floor of the conveyor and 13½ in. above the mine floor. The highest points on the conveyor are the light guards, which are 20 in. above the mine floor. The channel of the conveyor in which the coal is transported is 24 in. wide, and the flights are spaced 39 in. apart. Although the conveyor can be operated in reverse with some difficulty, it is designed primarily to transport a load only in the direction toward the operating controls. The conveyor trans-

Planer at the start of a new cut



Plan of experimental section

ports a load at a uniform speed of 150 fpm.

As previously stated, the speed of the planer is 75 fpm in either direction, while the conveyor transports a load in one direction at 150 fpm. Therefore, the effective speed of the conveyor is the difference, or 75 fpm, when the planer is moving in the same direction as the conveyor, and the sum of speeds, or 225 fpm, when the planer is traveling in the opposite direction. Although the planer mines the same quantity of coal when moving in either direction, the conveyor load varies inversely with the effective speed of the conveyor; about three times as much coal is conveyed when the planer is traveling toward the belt entry as when traveling in the opposite direction.

Pneumatic Conveyor Shifters

At the beginning of the experiment 17 pneumatic shifters spaced 20 ft apart were attached to the frame of the gob side of the conveyor. Later, another shifter was added near the discharge end of the conveyor to assist in shifting the drive unit as mining progressed. A shifter is a pneumatic device comprising an eight-in. steel cylinder, a piston, a double-action valve, and a steel prop attached to the end of the piston rod. Although a shifter has a maximum thrust of 32 in., the effective distance the conveyor is moved before the prop must be reset is about 26 in. Over-all length of a shifter, when fully extended, is about 8½ ft. Air, under pressure of 60 to 70 psi, is transmitted from the air line through rubber hose to the pneumatic shifters.

Use Two Drive Units

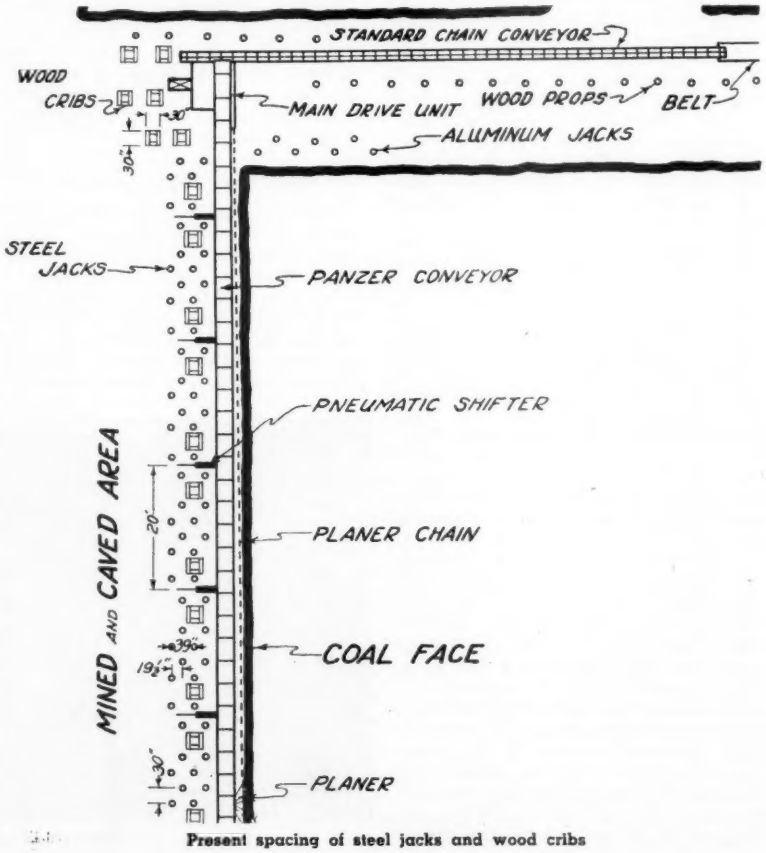
The planer-conveyor unit derives its power from symmetrical drive units. One unit is an integrated part of the discharge end (main drive) of the conveyor, and the other is an integrated part of the opposite end (auxiliary drive.) Only the drive unit at the discharge end of the conveyor is equipped with operating controls. Electric motors are enclosed in flameproof housing, and other moving parts are covered with steel guards and plates. Each unit is mounted on a steel skid and is made up of 40-kw, 50 cycle, ac motor with all necessary couplings, speed reducers, etc.

Electric power was transmitted through a surface drill hole into the mine at 2300 v, 60-cycle, ac. This power was used to drive a 200-hp motor-generator set, housed in a crosscut in the main entries near the discharge end of the panel belt. It supplied electric power to the planer unit at 500 v, 50-cycle, ac. This conversion was necessary to conform with the requirements of the German-built planer motors and other electrical equipment. Starters for each of the two driving motors, as well as a small transformer for the light circuit, the main power switch, and various circuit breakers are the principal components of a control panel. Power was supplied to the face lights at 220 v, 50-cycle, ac; and to the electro-magnetic controls of the compressed-air operated clutch in each drive unit at 500 v, 50-cycle-ac.

Roof Control

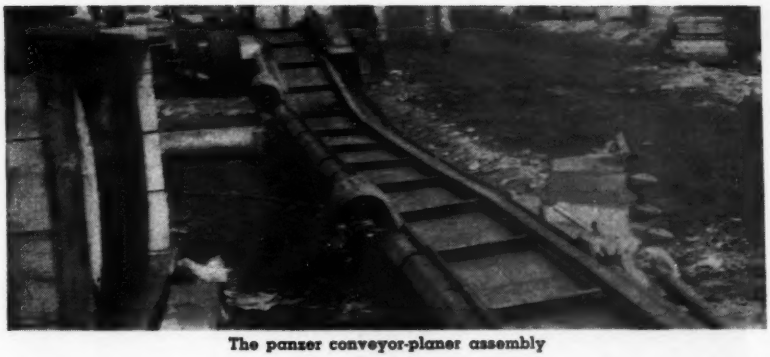
Chain pillars of the panel entries were not mined. To induce a break in the immediate roof at the beginning of the face mining, the roof was drilled and blasted by a row of holes three ft deep on six-ft centers and at about a 45° angle into the roof. When the face had been retreated about 16 ft with no immediate break, the roof was blasted. During the following four shifts the break was confined to the shale immediately above the coal. On the fifth shift the roof began to cave up to about 20 ft.

Shortly before the Christmas holidays, water was collecting on the face and to provide additional roof support, 20 wood cribs on 10-ft centers were set along the wet portion of the face. Some of the cribs were not recovered; as a result, additional weight was shifted toward the coal face and caused the immediate roof to break over the conveyor. It also forced the



Present spacing of steel jacks and wood cribs

steel jacks into the wet clay bottom and made the recovery of the jacks difficult. After the face was retreated 165 ft from the unrecovered cribs (or a total retreat of 400 ft) a main roof break was indicated by excessive weight on the face. A row of cribs on 10-ft centers was set along the entire length of the conveyor. About this time cracks appeared on the surface over the area, but no pressure was noted on the chain pillars of the belt entry inby the face line. This indicated that the main-roof break was confined between the chain pillars of the entries on either side of the block of coal being mined.



The panzer conveyor-planer assembly

Roof supports were wood cribs and steel jacks with I-beam caps. This particular type of jack is relatively new. It can be extended as much as 8½ in. and locked when set as a roof support and can be unlocked and retracted for recovery. Each jack is equipped with four friction rings, which permit it to yield or be compressed as much as 2½ in. when subjected to a load exceeding 40 tons. After a jack has yielded the full 2½ in., it will withstand a load of 100 tons before failing, provided no lateral movement or stress occurs. To restore the yielding capacity of the jack, the deformation tube in its base must be inverted. This repair can be repeated as often as necessary, using the same deformation tube.

Experiment With Wood Cribs

During the first few weeks of the experiment wood cribs were not used along the face but were used in the entries inby the main-drive unit. Cribs nearest the gob were dismantled under protection of wood props and reset near the drive unit as mining progressed. At this time at least five rows of steel jacks about 19½ in. apart were maintained parallel with the face and between the conveyor and gob. As mining progressed and space was provided, these rows were extended toward the face. At the same time an equal number of jacks were recovered from along the gob and reset along the conveyor. Each of the steel jacks supported a 39-in. steel I-beam cap; these caps formed a line perpendicular to the face. Caps supported by adjacent props were hooked together at the ends to form continuous beams perpendicular to the face.

On several occasions, particularly when water had accumulated along the face, many of the jacks nearest the gob were forced 12 in. or more into the fire clay. Consequently, production was retarded, and difficulty was experienced in recovering the jacks. With no water on the face, the bottom heaving at the two rows of jacks nearest the gob was about three to four in.

To relieve the jacks of some of the load and to guard against possible loss of the longwall face, a single row of wood cribs, spaced eight to 12 ft apart, was set parallel with the conveyor. Each crib replaced one row of jacks perpendicular to the face. Cribs were constructed on mounds of fine coal to facilitate recovery. After mining had progressed six to eight ft, they were dismantled and reset near the conveyor. Experiments proved that by using only four rows of jacks parallel with the conveyor, the recovery of jacks was less difficult. A marked improvement was noticed in roof control, bottom conditions, and planer operation; and the combination plan of cribs and jacks adopted was continued to the end of the experiment.

A summary of mining operations

Width of longwall face and width of block mined	328	ft
Length of block mined	1,441	ft
Area of block mined, acres	10.85	in.
Average thickness of coal bed	34	in.
Clean coal recovered from raw coal	95	%
Total number of single shifts operated	93	
Average retreat of face per shift	15.5	ft
Number of man-shifts to mine block	3,004	
Number of man-shifts to develop panel, includes moving	2,537	
Total number of man-shifts to develop panel and mine block	5,541	

	Raw coal, tons	Clean coal, ton
Production from panel	54,158	51,450
Average production per shift for 93 shifts	582	553
Average production for 15 consecutive days at peak production	731	694
Maximum production for one shift	842	800
Average production per man-shift for 93 shifts	18.0	17.1
Average production per man shift for 15 consecutive days at peak production	19.4	18.4
Production from development of one side and inby end of experimental section	17,667	16,784
Total production from development of panel and mining block	71,825	68,234
Average production per man-shift in developing panel and mining block	13.0	12.3
Average production per man-shift for development and mining by conventional method at mine	10.9	10.4

Area Recovery Higher

Recovery in the first panel mined by the planer was 83.3 percent, as compared with a recovery of 78.1 percent in a panel mined by the conventional method in use at the mine. In computing the percentage recovery by each method of mining, only the area inby the main-entry barrier pillar was considered. The planer area included: (1) one set of three butt entries, (2) the two inby parallel connecting rooms, and (3) the block of coal mined with the planer. Similarly, the area mined by the conventional method included: (1) one set of three butt entries and (2) the area mined by all rooms turned from these entries. As previously stated, rooms at this mine are driven 50 ft wide on 60-ft centers, and no barrier pillars are left between mined rooms of adjacent panels.

Even though no room pillars are extracted in conventional mining, the percentage recovery of coal mined from a panel at this mine is higher than the average percentage recovery for room-and-pillar mining. Although the planer mined the entire block of coal without leaving any pillars, the increased recovery over the recovery by conventional method appears to be small. There are two reasons for this. First, three entries needed to develop a 328-ft longwall face would have developed a block of coal 575 ft wide

(*Continued on page* 76)

Conversion Sub-Station Location And Equipment, Part II*

A Report of the Underground Power Committee Describing the Characteristics of AC to DC Conversion Equipment

By JOHN DUNN
Sub-Committee Chairman

POWER usually comes to the mine as high voltage ac, and is then converted to dc for the haulage and face equipment. As shown in the previous discussion on substation location, it is not practical to transmit large amounts of dc great distances; therefore, as the mine is extended, it becomes necessary to extend the higher voltage ac system and add or move up the conversion units as required. Application of conversion equipment very often is a problem of selecting equipment with suitable characteristics, both electrical and physical. There are three commonly accepted means of conversion, namely; (1) synchronous converters, (2) motor generator sets, and (3) power rectifiers. Each of these is discussed in this report from a standpoint of; (1) components, (2) relative efficiency, (3) system power factor, (4) overload capacity, (5) maintenance, (6) grounding, (7) voltage regulation, and (8) construction.

Equipment Components

A synchronous converter has a fixed theoretical ac to dc voltage ratio. In order to supply proper ac voltage to obtain the desired dc output voltage, a step-down transformer is used. This transformer is designed to give proper electrical characteristics when used with the converter. The transformer primary may be wound for any supply voltage. Switchgear is required on the primary and secondary side of the transformer and on the dc side of the synchronous converter.

A motor generator set for mining service is usually driven by an 0.8 power factor synchronous motor, which can usually be designed for supply voltages up to 2400 or 4160 v Y. No transformers are required for use with motor generators up to this voltage. Switchgear is required for the ac motor and the output side of the dc generator.

There are two types of power rectifiers in use, first and most common is the mercury arc rectifier. The other type is the dry plate rectifier, the most usual being the selenium oxide type. Both types of rectifiers require ac switchgear, transformer, rectifier and dc switchgear. To obtain proper dc output voltage, the low voltage side of transformer must be wound to give proper input characteristics to the rectifier. The high voltage side of transformer may be wound for any supply voltage.

At the time of this report germanium rectifiers or mechanical rectifiers are not available for mining service.

Relative Efficiency

Relative efficiency of the different types of converters is one of the first factors to be considered when choosing coversion equipment. The average mine load is a series of sharp peaks superimposed on a fairly steady base load. Very often these peaks are even as high as the overload or short time rating of the conversion equipment, and yet the ratio of the average load to the rating of the converter is only 40 to 75 percent. There are, however, periods of light load, or even no load, which are occasioned at times when the mine is not producing. But availability of power is imperative. Therefore, in deciding which unit best fits the conditions, it is very important that the partial load and no load losses be considered. By referring to the chart, Fig. 1, on comparison of equipment losses, it can be seen that the motor generator set losses are a great deal higher than with the synchronous converter or the ignitron rectifier. Below 75 percent load, the ignitron rectifier losses are somewhat lower

* How to locate sub-stations properly was outlined in Part I which appeared in the September issue of Mining Congress Journal.

than the converter, but are a little greater above that point.

Selenium oxide rectifiers are comparatively new in the mining industry, and available data on losses for this type equipment are rather conflicting. There is a reason for this since the rectifier elements are, in effect, resistors having a comparative low forward resistance and a high backward resistance. Since it is a resistance, and resistance varies with the conducting area of the plates, it can be seen that the plate area would greatly affect the losses. Indications are that a selenium rectifier competitively priced with the other types of conversion equipment having voltage control, might have losses somewhat greater than the motor generator set at loads above 75 percent and slightly less at loads below this value.

To illustrate what the losses in conversion equipment mean, an example would help. Assume a 300-kw conversion unit carrying a 300-kw load at 35 percent load factor, for 8000 hours per year. . . . estimated annual losses are:

MG set	256,250 kw-hr
Synchronous Converter	117,000 kw-hr
Ignitron Rectifier.....	79,250 kw-hr

At a cost of one cent per kw-hr, it would cost $1770 more per year for losses in the MG set than in the ignitron rectifier.

System Power Factor

It can be seen from the chart, Fig. 2, showing comparison of power factor, that the synchronous MG set is desirable where corrective kva is needed to reduce penalty in power contracts. The synchronous converter and the ignitron rectifier both operate at a lagging power factor. Indications are that the selenium rectifier power factor would be about 98 percent at full load. Where corrective kva is needed to improve the system power factor, and it is desirable to take advantage of lower conversion losses, capacitors can be used. Also, very often synchronous motors can be used on mine fans, pumps and stationary compressors at a savings in cost and obtain corrective kva.

Overload Capacity

Most types of conversion apparatus for mining service are designed for 150 percent load for two hours and 200 percent load for one minute. The one minute rating on the synchronous converter and motor generator set is largely determined by the commutation limits on the dc side of the equipment, and the ability of the ac driving motor to stay in step during overload. Although the ignitron rectifier is rated the same as rotating types of conversion equipment, experience has shown that it is capable of carrying higher peak loads for a period of a few seconds duration.

The selenium rectifier has about the same overload characteristics as the ignitron if it has enough plate area, and temperature limits are not exceeded.

Maintenance

In addition to comparing the characteristics of three types of conversion equipment, it seems worthwhile to consider the matter of maintenance. The synchronous converter, and MG set are both rotating machines and, as such, present a problem of wearing parts. Dust and dirt cause wear in bearings, commutators and brushes. Dirt collecting on the windings of the equipment causes deterioration and subsequent heating. In order to minimize this wear it it necessary to clean the equipment frequently. This is an item of expense which must be given due consideration.

An ignitron rectifier has no major rotating parts. It is expected that the main tubes of the rectifier may have to be replaced occasionally; however, it should be pointed out that the sealed ignitrons have a warranty of one year shelf life plus two years operation. Present day records obtained from operators using this type of equipment indicate that many tubes have been operating four years or more.

Maintenance on ignitron rectifier equipment consists of normal maintenance on control and switchgear components, checking the level of the liquid in the transformer, adding small quantities of water to the temperature regulating equipment, and an occasional tube replacement. Due to the absence of large rotating equipment which requires close attention, the rectifier may be installed in remote locations without a permanent attendant. Many installations are now in operation in out of the way places and only periodic inspection of the equipment is made. In many cases this inspection consists of two visits a week—the first being a visual inspection and the second a weekend visit for general maintenance.

The selenium rectifier like the ignitron has no major moving parts except for small cooling fans and motor operated tap changers for voltage control. Because of the low forward aging characteristics of the selenium cells, it is expected that they will have comparative long life.

Grounding

Mine haulage equipment uses the rail as one side of the dc circuit and hence conversion equipment must operate with one pole grounded. All

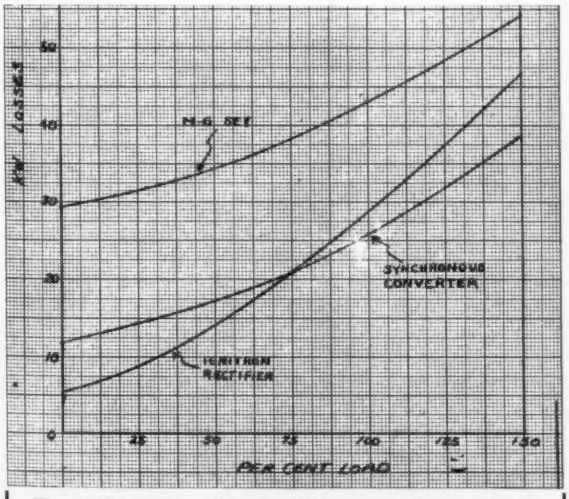


Fig. 1—Comparison of losses of d.c. conversion equipment —300 kw—275 v.d.c.—2400 v.a.c.

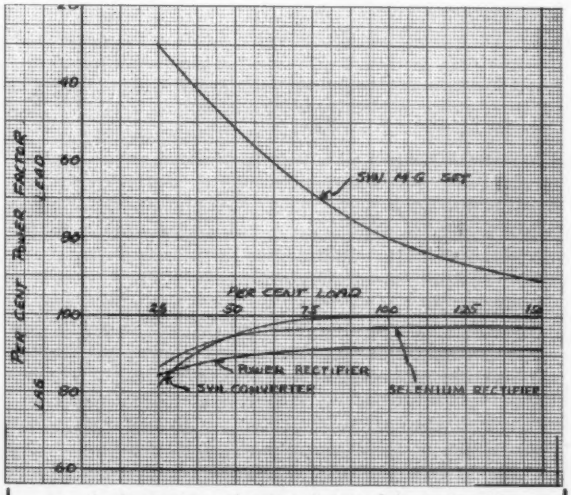


Fig. 2—Comparison of power factor of d.c. conversion equipment—300 k.w.—275 v.d.c.—2400 v.a.c.

three types of conversion units will operate satisfactorily with either the positive or negative grounded.

Ignitron rectifiers are best suited for positive grounding since cooling water, which circulates between the tubes and heat exchanger, contacts the positive part of the sealed ignitron tank. Temperature regulating equipment can then be grounded and the danger of personnel coming in contact with live parts is minimized. The ignitron rectifier can be arranged for grounded negative operation by simply inserting a length of insulating hose in the cooling system and placing insulators under the heat exchanger. (The bus structure is always mounted on insulators.) A screen enclosure is provided for the heat exchanger to insure safety of personnel. This is all done at the time the equipment is designed.

Selenium rectifiers are well suited for operation either negative grounded or positive grounded.

Voltage Regulation

The dc voltage of the synchronous converter and the power rectifier are dependent upon the voltage and frequency of the ac supply, while the voltage of the motor generator set is dependent upon frequency only. On systems having a wide fluctuation in ac voltage, the MG set has a distinct advantage. Fig 3 pictures a characteristic voltage curve for MG sets and Fig. 4 shows the same curve for ignitron rectifiers.

On systems having a fairly steady power supply, the dc voltage may be regulated to remain constant over a range. The MG set and synchronous converter voltage are regulated by compounding. Output voltage of the ignitron rectifier is regulated by means of phase control of the ignitron tubes.

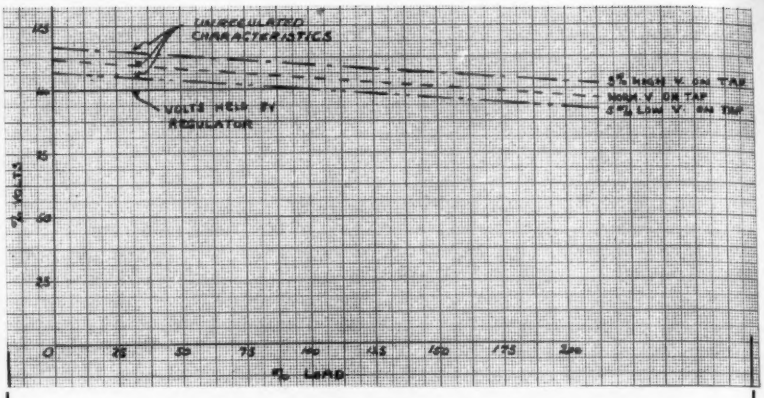


Fig. 4—Voltage regulation curve for sealed tube rectifier

Output voltage of the selenium rectifier may be regulated by the use of a tap changing transformer, induction regulator, or saturable core reactor.

By referring to the voltage chart for an MG set it is seen that the output dc voltage would be fairly uniform. The curve for the synchronous converter has been omitted since it is approximately flat like the motor-generator except that it fluctuates with the ac input voltage. By proper selection of transformer tap and setting of voltage regulator, the rectifier can correct for internal voltage drop and also correct for some ac line regulation.

The voltage curve, Fig. 5, for the selenium rectifier shows unregulated voltage drop in one type of selenium rectifier with transformer. As previously stated the conducting area of the selenium cell affects its resistance and would affect voltage. This curve is typical and does show that there is a voltage regulation problem. It is recommended that further information, if needed, be secured from the manufacturer.

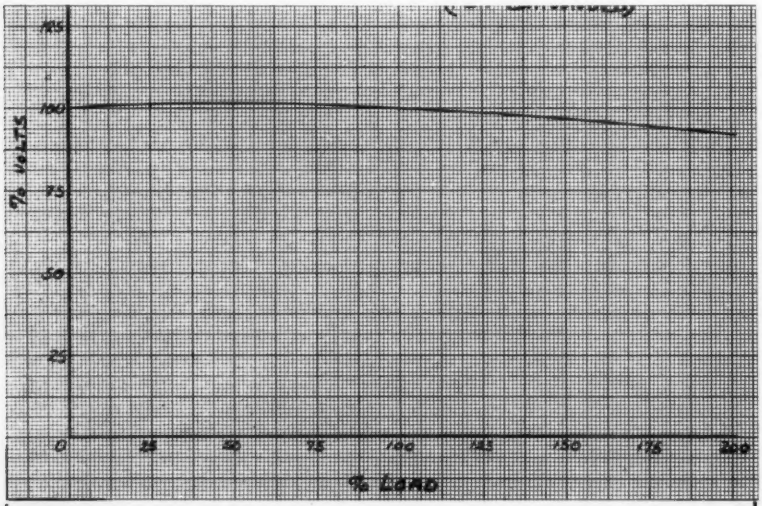


Fig. 3—Voltage regulation curve for motor generator set (flat compounded)

Construction

Since the maintenance of adequate voltage at the mine load center means that substations must be located near enough to these centers, construction of the equipment must be considered. Physical size of the equipment and its associate switchgear often plays an important part in locating substations. If the mine can be adequately served from drift openings it may not be too difficult to make substation moves. If the mine is to be served from outside substations through boreholes then the accessibility of the substation location is important. Should cover above the coal seam be too thick to serve economically through boreholes then the substation equipment must be located inside the mine.

Motor generator sets in sizes 300 kw and above are generally large, heavy and difficult to move. This may influence the choice of this type of equipment. Synchronous converters are much smaller than motor-generator sets and normally easy to move. Both types of equipment are not very well suited for inside mine substations, even though they are used inside. Dust in the mine air and very often moisture materially increase maintenance on rotating machinery and commutators. If overhead clearance is a factor then the size of motor generators or converters might limit movement through the mine.

The power rectifier is similar to the converter in case of handling to outside substations and is much better suited for inside locations in the portable type. Components are built on cars with wheels for movement over the mine track. These cars are normally built down to 42-in. clearance above the rail. Each car is complete and wired, ready to be set off on a side track and coupled together. Complete units are easily put in service by connecting ac power cables and dc power

cables. Since there are only a few small moving parts on the power rectifier, maintenance is low, even when located inside the mine. The MG set and the synchronous converter are available in portable equipment for track mounting. Listed below are approximate limiting heights above rail:

	300 kw	500 kw
MG Set	48 in.	62 in.
Synchronous Converter	56 in.	66 in.

Purchase of Used Conversion Equipment

Very often the mine operator is limited in the amount of money available for the purchase of needed conversion equipment. At times some good usable equipment is available and at other times available equipment has very little value. Some available second-hand conversion equipment is 40 or more years old. The purchaser should be very careful that he knows the condition of equipment he is buying and that it will be economical for him to operate. He should also know the switchgear associated with the equipment and know that it will be suitable for use at his operation and on the power source available there.

In the past 40 years switchgear standards have changed almost completely. Also, power systems have grown and power companies have had to build up their systems adding capacity until now switchgear interrupting capacity is a very important factor. A great deal of the primary switchgear associated with second-hand conversion equipment has only 12 to 15 mva interrupting capacity while the operator might have 25 to 50 mva available on voltages up to 2400 and even more on higher voltages.

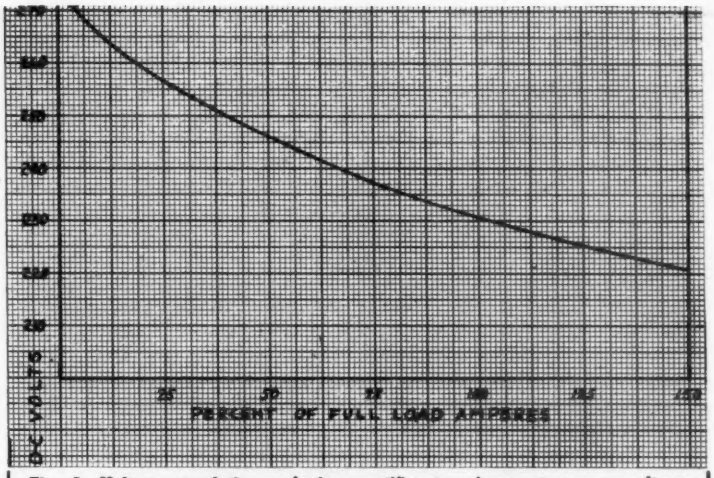
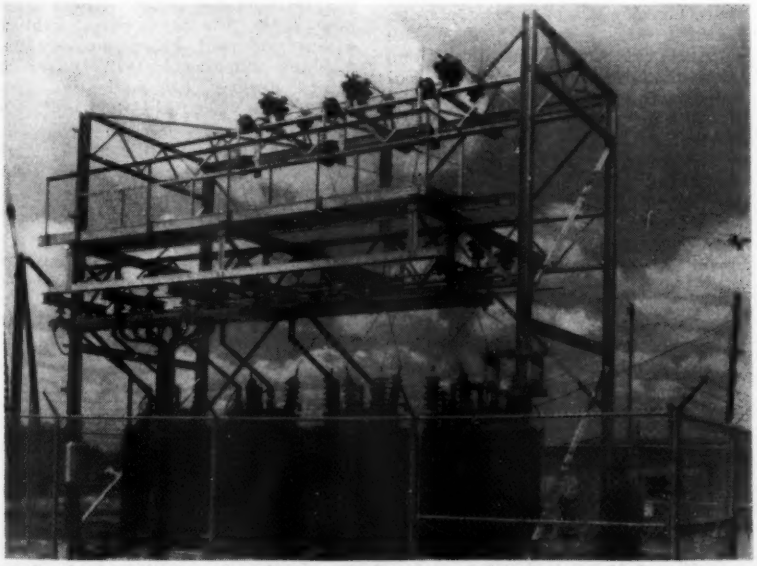


Fig. 5—Voltage regulation, selenium rectifier transformer type—no voltage control

Another important factor is replacement parts. A great deal of the older switchgear and equipment is now obsolete as far as the manufacturer is concerned. Replacement parts are either not available or must be handmade which greatly increases cost of maintenance. Very often it is economical and advisable to replace old switchgear, or switchgear parts, with new in order to use second-hand equipment.

Check These Points

Listed are some check points to be used as a guide in purchasing used conversion equipment:



Depth of overburden often dictates whether or not substations can be located on the surface

Primary or high voltage switchgear

(1) Does it match service voltage with which it is to be used?
(2) Interrupting capacity
(3) Ability of relaying and protective equipment to furnish adequate protection to equipment
(4) Instrument transformers; do they match, do they have proper ratios, will they stand available short circuit current?

Transformers

(1) Suitable for service voltage and for use with conversion equipment
(2) Condition of windings, case, oil if used, and cooling ducts
(3) If voltage change is necessary, core and clearances must be checked
(4) Condition of entrance bushings and leads

Conversion Unit

(1) Condition of windings, commutator, collector rings and cooling ducts
(2) Bearings
(3) Insulation
(4) Voltage, frequency and capacity

Low Voltage Switchgear (if synchronous converter)

(1) Condition
(2) Is it suitable for use?

DC Switchgear

(1) Capacity and voltage rating
(2) Protective relaying
(3) Condition

If the conversion equipment is to be operated unattended, consideration should be given to protective relaying suitable for unattended operation. This would include ac thermal protection, ac current balance where necessary, field current protection, bearing temperature protection and dc relaying suitable for the application.

Topics of national import were discussed before capacity crowds at the general sessions

Mining Looks Forward

Breaking All Records, Denver Meeting Is Huge Success

OVER 6700 metal and nonmetallic mineral mining men and ladies met in Denver during the week of September 22 for the Convention and Exposition of the Western Division, American Mining Congress.

Outstanding problems of the mining industry were thoroughly discussed in the meeting rooms. One of the sessions that will be long remembered was the day-long discussion of the report of the President's Materials Policy Commission, which took place on the first day of the convention. Here the so-called "Paley Report" came in for a thorough going over, in which members of the Commission, leaders of the industry, and prominent legislators took active parts. Other topics such as national minerals policies, taxation, public lands, problems of the small miner, gold, silver and monetary policy, strategic minerals, uranium mining and atomic energy claimed the attention of large numbers of interested listeners and speakers, no less distinguished than those who took part in the first day's proceedings.

For those more interested in the operating side of the mining picture, capacity sessions were held dealing with progress in mechanization, open-pit mining, shaft sinking and roof support, advances in milling practice, new metallurgical processes, prospecting and exploration and rock breaking. Audience participation was keen, and many points not covered by the speakers were brought out in discussions from the floor. The only complaint heard was that there wasn't time enough to see and hear everything.

The entire program showed the results of the months of planning by a highly representative program committee headed by National Chairman Otto Herres, Vice-President of Combined Metals Reduction Co., and each paper reflected hard work and careful study on the part of its author.

Exposition Tops Too

But the sessions were only half the Show. More than 150 manufacturers of every kind of mining and milling machinery, including suppliers of auxiliary equipment and the thousand and one other things needed to make a mining venture operate efficiently, economically and safely, went all-out to present latest developments.

The exposition occupied the entire available space in the newly enlarged Denver City Auditorium, and equipment too big to fit inside the building was accommodated in several large parking lots adjoining. There were new types of locomotives, drilling equipment, roof bolts, conveyors, mucking machines, electrical and safety devices, communication systems, ultra-violet lights and radiation counters for prospecting, rod mills, ball mills, steel cables, models of huge shovels, and full size tractors, trucks and scrapers. All these were displayed by the manufacturers responsible for their design and construction, whose representatives were on hand to answer questions and explain their applications. Various important items of equipment were being shown to the mining industry for the first time.

Opening Ceremonies Impressive

Western Division Chairman Merrill E. Shoup, president of the Golden Cycle Corporation, formally opened the convention on Monday morning.

In his opening remarks he noted that the American Mining Congress was first organized in Denver almost 55 years ago and pointed out that it

has since grown to nationwide importance as representatives of the entire mining industry—presenting mining's views in national affairs and promoting safety and efficiency in all phases of the industry all over the nation.

Hon. Thomas P. Campbell, Acting Mayor of Denver, welcomed the members of the Mining Congress to the City. He pointed out how great has been the part played by Denver and Colorado in the history of mining in the United States. Governor Dan Thornton extended a stirring welcome to the mining men in behalf of the State of Colorado, and in effect, sounded the keynote of the convention when he said, "This great West of ours and this great nation of ours should look forward with the progressive, active mining industry which means so much to our State, to our nation, and to the world."

Howard I. Young, President of the American Mining Congress and Otto Herres responded to the welcoming addresses of the Governor and Mayor, and expressed the thanks of the members for the warm reception they had received in Denver. Charles B. Stainback, of Westinghouse Electric Corp., Chairman of the Manufacturers Division, and William J. Coulter, Vice-President of Climax Molybdenum Co. and General Chairman of Arrangements, were also called upon for a few words. Mr. Coulter took this occasion to express his appreciation for the fine work of the many arrangements committee members who had contributed to the outstanding success of the Convention.

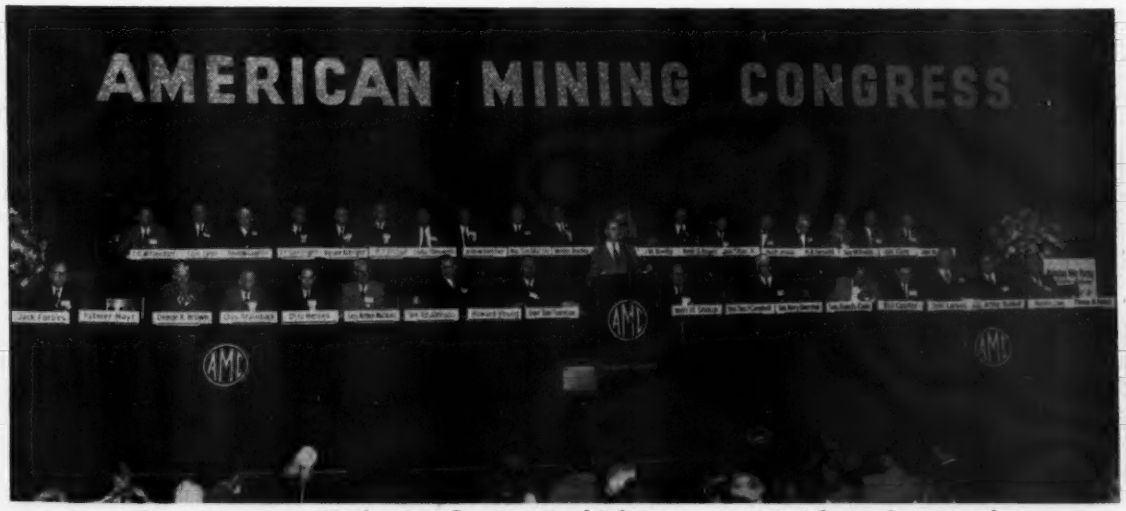
Chairman Shoup then introduced the long list of distinguished guests seated on the platform. Among these were: Senators Edwin C. Johnson of Colorado, Henry C. Dworshak of Idaho, Arthur V. Watkins of Utah, and Francis Case of South Dakota; Representatives Thomas E. Martin of Iowa, J. Edgar Chenoweth, Wayne Aspinall, William S. Hill, and Byron Rogers of Colorado; Hon. Jess Larson, Administrator of DMPA and GSA; Arthur H. Bunker, President, Climax Molybdenum Co. and Member of the President's Materials Policy Commission; George Rufus Brown, also a member of that Commission.

Men from every branch of the mining industry . . .

. . . took part in the operating sessions

He also recognized the Directors of the American Mining Congress and chairmen of its standing committees, seated on the platform.

Other distinguished guests introduced included: Warren Lowe, Business Editor of *The Rocky Mountain News*; J. J. Forbes, Director, U. S. Bureau of Mines; Thomas B. Nolan,



An imposing array of leaders from Government and industry were present at the opening ceremonies

At the Board of Governors luncheon plans for next year's meeting were discussed

Acting Director, U. S. Geological Survey; Tom Lyon, Director, Domestic Expansion Division, DMPA; L. M. Case, Director, Mining Machinery Branch, NPA; C. O. Mittendorf, Administrator, DMEA; and John W. Evans, Director, Office of International Materials Policy, Department of State.

State Mining Secretaries Confer

On Sunday morning immediately preceding the convention, representatives of the various state mining associations met to discuss various problems of common interest. After a brief talk by Julian D. Conover, Executive Vice-President, American Mining Congress, Charles F. Willis, State Secretary, Arizona Small Mine Operators Association, discharged the duties of Chairman until the arrival of Robert S. Palmer, Executive Director of the Colorado Mining Association. Among the topics discussed were the current agitation on the part of the Bureau of Land Management for changes in the Public Land Laws; correct stream utilization; tax matters; public relations of the mining industry; gold and silver; and the tentative changes in Regulation "A," having to do with mine financing, proposed by the Securities and Exchange Commission.

Resolutions Approved

At appropriate points in the convention proceedings, the resolutions incorporated into the Declaration of Policy (see pages 71-76) were presented and approved by the convention delegates. These set forth clearly the views of the mining industry on national policies affecting the production of metals and minerals.

The Resolutions Committee, under the chairmanship of Kenneth C. Keller of South Dakota, had met on the two days preceding the convention, to consider suggestions sent in by mining men from every part of the United States. From the sounding board of these deliberations came statements of policy in specific, understandable language expressing the views of mining men throughout the industry. They are expressed for all the world to see what the mining men of America believe in and stand by.

Special Conferences Attract Many

On Wednesday afternoon, when no regular sessions were scheduled, special conferences were held on strategic minerals and on mine taxation. S. H. Williston, Chairman of the AMC Committee on Strategic Minerals, presided at the former, while H. B. Fernald, Chairman of the AMC Tax Committee, presided at the latter. At the Strategic Minerals conference, outstanding authorities on tungsten, antimony, chrome, mercury and manganese addressed the gathering. Brief abstracts of what they had to say are given in the section of this issue (pages 81-121) devoted to abstracts of convention papers.

The conference on tax matters went more deeply into the technical aspects of the over-all tax problem than time permitted at the Tax Panel on Wednesday morning.

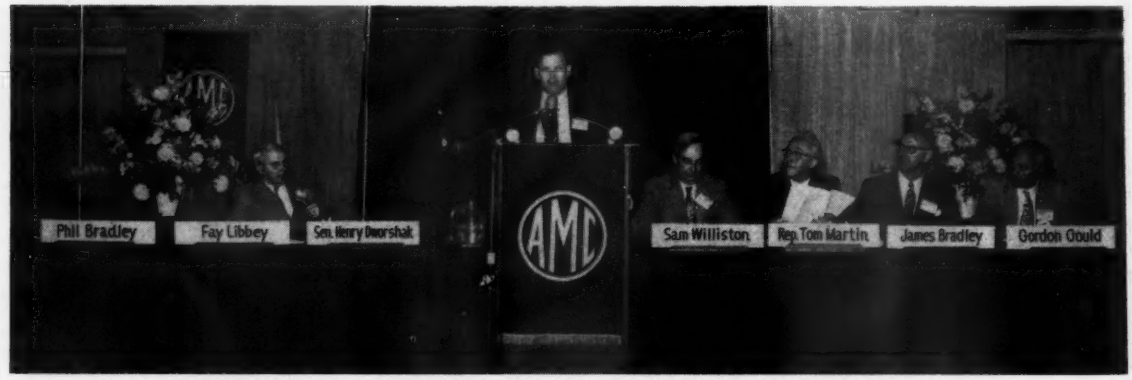
Board of Governors Meet

On Thursday the Board of Governors of the Western Division convened at a luncheon meeting at which Merrill Shoup presided. Here Robert M. Hardy, President, Sunshine Mining Co., was unanimously elected Chairman of the Western Division for 1953. He will play a leading role in developing plans for the 1953 Convention, to be held in Seattle. Also duly elected were the candidates for the Board of Governors nominated by the various state associations.

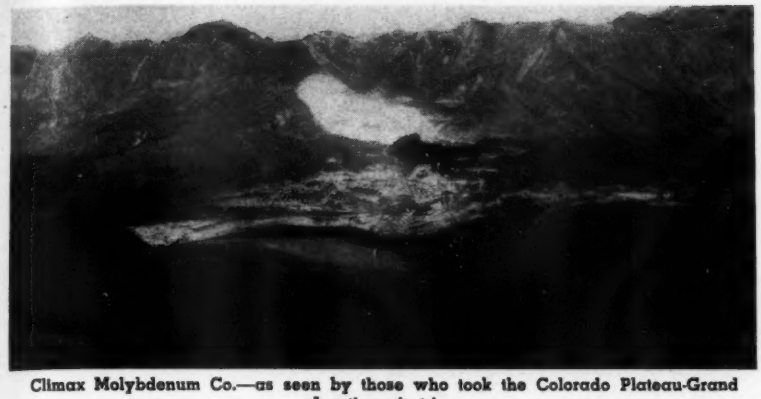
Plans for the Seattle meeting were discussed and approved. This will be the first time the American Mining Congress has ever met in that City. As planned, the meeting will be on a scale comparable to the very successful convention held in Los Angeles a year ago. Hotel accommodations will be handled by a Housing Bureau and assignments will be made around July 1 of next year.

An invitation from San Francisco to hold the next convention and exposition in 1954 in that City was extended by Worthen Bradley, and received with appreciation by the Board.

A highlight at this luncheon was the talk by Otto Herres in which he contrasted conditions 25 years ago with those prevailing today. He quoted a conversation he had had with ex-President Herbert Hoover in which the latter, in spite of present discour-



P. R. Bradley, Jr., spoke on the manganese situation at the conference on strategic minerals



Climax Molybdenum Co.—as seen by those who took the Colorado Plateau-Grand Junction air trip

agement, said, "I still have faith in the American people."

Ladies' Event

All the ladies who came to the convention were invited to attend the convention sessions and social functions as well as the exposition, and many of them were in evidence at all three. In addition a delightful program of special events was planned for their entertainment by the Ladies' Committee, headed by Mrs. B. C. Essig as Chairman and Mrs. H. B. Crandall as Vice-Chairman.

With true western hospitality, Mr. and Mrs. Stanley Wright held a tea and reception for the visitors on Monday afternoon at their home on University Boulevard. A luncheon at the Silver Glade of the Cosmopolitan hotel on Wednesday was followed by a Style Show presented by Neusteter's. Both of these events were fully enjoyed by the ladies.

Thursday's sightseeing bus trip through the beautiful mountain parks that surround the city of Denver, followed by luncheon at the Willow Springs and Denver Country Clubs, was another high spot of the week for the ladies who attended the convention.

Field Trips Follow Meeting

Those who came early and stayed over after the final sessions of the convention enjoyed a fine series of field trips arranged by the Trips Committee. E. D. Dickerman, Chairman and Vice-Chairmen G. R. Harris and R. W. Evans had foreseen almost every possibility and the seven trips scheduled ran off without a hitch.

On the Sunday immediately preceding the convention opening, 100 people journeyed by bus and car out to Golden and the campus of the Colorado School of Mines. There they saw the buildings and laboratories of the famous school and inspected the facilities of the Colorado School of Mines Research Foundation. Some of the ladies enjoyed tea at the home of President and Mrs. Vanderwilt, while the gentlemen enjoyed a "beer and snack" courtesy of the School and the Adolph Coors Co.

More than 60 people traveled to the famous Cripple Creek mining district by bus on Friday, where they toured Golden Cycle's Carlton mill, enjoyed a mountain trout luncheon as guests of John Deerksen, President, Front Range Mines, Inc., and dined at the Broadmoor in Colorado Springs. Another group journeyed to Pueblo as guests of the Colorado Fuel and Iron Corp., where they toured the largest steel mills west of the Mississippi River and enjoyed a buffet lunch at the Minnequa Club on the shores of Lake Minnequa.

By far the largest company of post-convention sightseers took the Climax-Leadville-Gilman bus trip on Friday and Saturday. They had lunch at Climax and visited parts of the mine and surface operations, and then journeyed on to Leadville, where they enjoyed a fish-fry provided by the American Smelting and Refining Co., Resurrection Mining Co., and the Public Service Co. of Colorado, at Turquoise Lake. The following morning the party proceeded to the New Jersey Zinc Co.'s mine and underground mill at Gilman. The return trip over Vail and Loveland Passes brought them back to Denver on Saturday night.

Those who elected to go on the air trips saw more of Colorado than their earthbound brothers. One group flew to Grand Junction and there transferred to buses to visit various establishments producing uranium for the atomic energy program—getting a glimpse of the "Glory Hole" at Climax on the return trip.

Another group of air travelers flew to Montrose, there transferring to buses for Ouray and the Idarado Mine. After a tour of the operations and lunch, they returned to the planes for the trip back to Denver. The third group to travel by plane followed a course over the Continental Divide to visit the U. S. Bureau of Mines experimental Oil Shale Mine at Rifle, and on the return trip had a bird's-eye view of the world's highest oil field at Rangely.

The consensus of all who elected to take one or another of the trips was expressed by one man who said, "Personally, I enjoyed every minute of it."

All Enjoy Social Events

Late on Sunday afternoon a gala reception in honor of the convention committees and speakers was held in the Silver Glade and Century Rooms at the Cosmopolitan Hotel. This get-together allowed those taking part in the program to get acquainted, compare notes and engage in some last minute relaxation.

The traditional Miners Jamboree was held on Monday night. So great was the demand for tickets to this event that no one hall in the City could comfortably hold everyone. Therefore the party was held simultaneously in the Mammoth Gardens, the Lakewood Country Club and the

The ladies enjoyed a bus trip through Denver's mountain parks

LINK-BELT

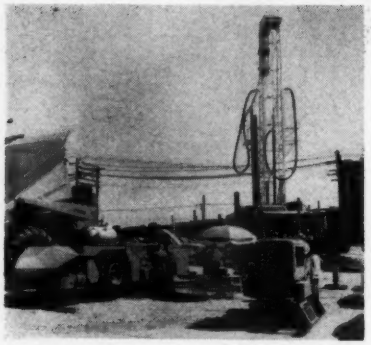
MARINA DIVISION

P&H

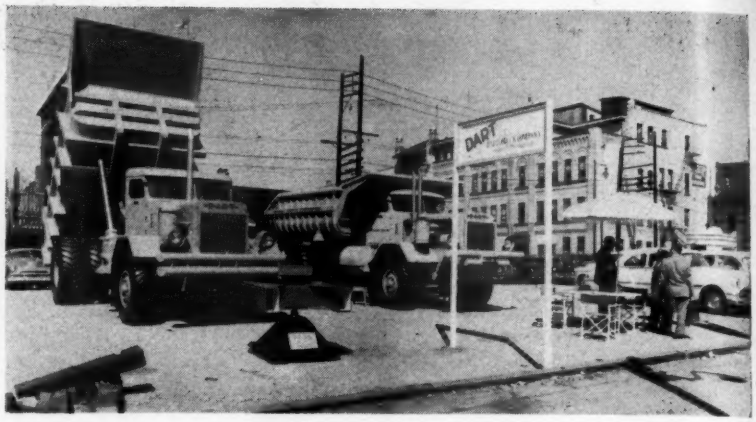
Bethlehem

Pioneer

TIMKEN
ROCK BITS
Exide IRONCLAD
UNITED STATES
Ingersoll-Rand
ATLAS POWDER
LINK-BELT SPEEDER



Rotary blasthole drill . . .



. . . Earth-moving equipment . . .

Aviation Country Club. Each spot had its full quota of merrymakers and its own orchestra for dancing. An excellent entertainment program was presented at each of the three parties, with many of the artists doing double duty. With the excellent food, fine entertainment and superfine dance music everyone had a wonderful time.

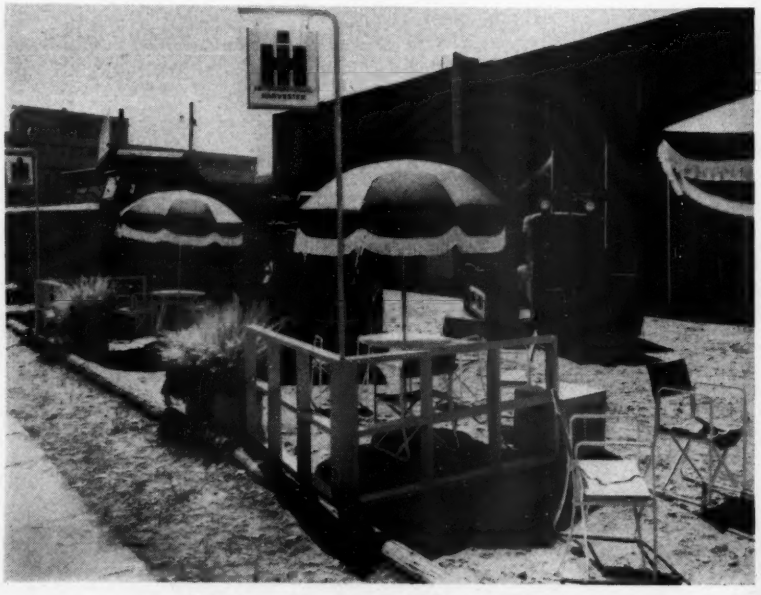
Tuesday and Wednesday evenings were left open for convention visitors to do as they pleased—to entertain or be entertained.

Climax of the week's social activities came on Thursday evening, when the huge theater at the City Auditorium was filled with mining men and their ladies in gala mood. They all came to spend "An Evening with Victor Herbert." The lilting and nostalgic melodies of the immortal composer's familiar operettas captured the imagination of the audience. The voices of the singers and the performance of the 36-piece orchestra were matched only by their warm interpretation of the music and the brilliant staging of the production. When the final curtain came down, all too soon, it was generally agreed that this was the best entertainment ever presented at a Western Division meeting, and a fitting finale to a magnificent Convention and Exposition.

On to Seattle

Now that the 1952 Metal and Nonmetallic Mineral Mining Convention and Exposition have passed into the pages of never-to-be-forgotten history, it is time to think of the future. As Otto Herres said on the opening day of the convention, "There is this to be said for the future, it comes only one day at a time." Each day, however, brings its problems and by next September a whole new batch of problems, some solved, some still unsolved, will form the grist for the program at the 1953 Metal and Nonmetallic Mineral Mining Convention in Seattle. Plan now to attend—to learn from the experience of others and to offer your own experience to help others solve problems similar to your own.

. . . Big Trucks . . .



. . . and tractors were features of the outside exhibits

A Declaration of Policy

WESTERN DIVISION, AMERICAN MINING CONGRESS

Adopted at Denver, Colorado, September 22-25, 1952

COMMUNISM continues to threaten the liberty and security of all persons living in the free world. Lives of Americans and their allies are still being expended on the Korean battlefront. The sinister forces which have created tensions beyond our borders are matched on the domestic scene by corruption in high places, by waste and extravagance, and by a socialistic philosophy inimical to the welfare of the Republic. In combating these forces free men and free enterprise must continue their valiant stand.

In such a critical era a vigorous and expanding mining industry is of paramount importance to the security of the Nation. Development of new mines and expansion of mineral production necessarily involve financial risk. In recognition of this fact governmental activities and policies should be designed to encourage, rather than to hamper, the industry's efforts to achieve greater production of metals and minerals.

We are justly proud of the productive capacity of our industry, without which victory would never have been achieved in the two great global conflicts of the century. A high level of capacity should be the constant goal of all who sincerely adhere to the principle of free enterprise in a free world.

Communists and other subversives working within the framework of government and of labor unions are a real threat to our national existence, and their presence can no longer be tolerated. We insist that our public officials, whether in the executive or legislative branch, heed this danger to America, and take whatever action is necessary to eliminate such traitorous persons from Government activities and positions of authority.

GOVERNMENT EXPENDITURES

The costs of the emergency and of essential functions of government should be met adequately and efficiently, honestly and fairly, without waste and extravagance. Activities and projects, even if justifiable in normal times or as normal functions, should be curtailed, deferred or eliminated, unless absolutely essential in the emergency. Political favoritism, and local or group pressures, should find no place in determining defense needs or costs. It is the duty of citizens and organizations, the Administration and the Congress, not to ask or permit any violation of this basic principle. We have not the resources, neither the material nor the personnel to waste, or misuse. Legislative and administrative authorities should insist on applying these principles to budgets, appropriations and expenditures.

Congress must have a competent staff to review and consider requests made to it for appropriations and to assist it and its Committees in carrying out the foregoing principles. Billions of dollars annually are now being wasted.

TAXATION

Our existing Federal tax burdens must be substantially reduced if we are to maintain the system of private enterprise we are fighting to preserve. Our fiscal policies must be revised to remove their inflationary effects; our spending policies must be brought under control; and our revenue policies must be thoroughly overhauled.

With the need for unprecedented revenues, taxes must be imposed and administered fairly, equitably and honestly. Tax authorities should strive to administer the law as Congress intended. They should cease endeavors to find some narrow, hidden sense to justify regulations, rulings, definitions, and decisions designed to defeat or defy the Congressional intent. Our system of income taxation cannot be maintained unless the tax enforcement agencies regain the confidence of the public. Corruption must have no place in the collection of taxes. Much more than the current reorganization of the Bureau of Internal Revenue is necessary.

It is futile to expect funds to be invested either at home or abroad, especially in high risk enterprises such as mining, unless the investor has an opportunity to recover his capital and to receive a return commensurate with the risks he is taking.

The Congress has made sincere efforts to remove many of the tax obstructions to discovery and development of new mineral resources and increased production from existing mines. We commend the Congress for its efforts to improve the situation, but other measures still are needed further to remove the road-blocks to adequate productivity. These include the following:

(a) The Excess Profits Tax should be promptly repealed. Its many inequities should be removed retroactively.

(b) The limitations on deductibility of exploration expenses should be removed.

(c) In taxing the stockholder on dividends received, allowance should be made for taxes paid by the corporation; and depletion should be carried through to the stockholder.

(d) Losses of loss years should be computed on the same basis as taxable income; and deductions for percentage depletion and credits for dividends should not be denied either in the year of loss or in the year against which the loss is applicable.

(e) Tax exemption should be granted a new mine for three years after beginning of profitable operations.

(f) Depreciation should be much more fairly allowed, with full application of the tax benefit rule. Realistic depreciation allowances must permit early recovery of inflated replacement costs.

(g) During a period of inflation a tax upon capital gains is a levy upon capital. Increased revenues will result from more moderate rates.

(h) Even during an emergency, the overall rate upon the income of the individual or the corporation should not exceed 50 per cent. Greater incentive to the creation of income and greater revenues to the Government will result.

LABOR RELATIONS

Adherence to sound fundamental principles is necessary to properly guide the national policy in social, political, economic and governmental matters. There is increasing evidence that such paramount and essential principles as non-dictatorial government, security of individual rights and protection of the public interest are being deliberately ignored in attempts to circumvent and weaken the Labor-Management Relations Act. Congress should re-assert and make fully effective those necessary principles by amending the Act to:

1. Prohibit compulsory unionism in any form;
2. Prohibit labor monopolies and industry-wide bargaining;
3. Uproot communistic influence from the internal affairs of unions;
4. Require the President, in threatened national emergency strike or lockout situations, to utilize the provisions of the Act;
5. Prevent industrial sabotage;
6. Safeguard, from union encroachment, the functions of management and the rights of workers;
7. Effectively outlaw mass picketing, violence, intimidation and similar terroristic devices in labor disputes;
8. Require that decisions of the National Labor Relations Board be based upon preponderance of evidence;
9. Restore stability to labor agreements; and to
10. Create a department of Employer-Employee Relations in lieu of the Department of Labor.

The emasculation of the national emergency provisions of the Labor-Management Relations Act through administrative nonfeasance such as occurred during the recent steel crisis deserves severe censure. Measures designed to authorize plant seizure, to impose terms in labor agreements, or to compel arbitration by governmental agencies in labor disputes inevitably promote further domination of the public welfare by bureaucracy, and should be defeated.

Our problems will be solved by adherence to sound fundamental principles rather than through a bureaucratic or socialistic approach.

GOVERNMENT EMERGENCY MINERALS PROGRAM

Despite progressive increase in imports, the Nation still will look to its own reserves for most of its minerals supply.

By discovery, beneficiation or synthesis, the supply of most of the industrially important minerals may be increased in the United States.

We urge the cooperation of the Government with the mining industry to establish a realistic minerals program for the development of these reserves and to provide for needed increases in supply. We recommend the acceleration of topographic and geologic mapping of the United States and Alaska, now only 11 percent completed.

During the Korean crisis and rearmament emergency Congress has delegated authority to Government agencies to regulate the mining industry by means of allocations, price controls, wage and salary stabilization, taxes and similar devices. To meet emergency needs we urge these agencies to cooperate with the efforts of the mining industry to produce a dependable supply of metals and minerals sufficient for national defense and essential civilian use. Industry requires assurance of adequate market prices in order to undertake the mine development needed for dependable future production.

It is the responsibility of the Government in times of war and great emergency to see that a continuing and expansible flow is provided of the scarce materials vital to national security. The most secure source is from domestic and North American properties where a minimum of Government assistance is required at the expense of the American taxpayer.

We urge that Government agencies afford domestic mines at least the same price and other considerations and advantages given foreign production.

The Price Stabilization Law should not be used as a means to discourage the development and production of metals and minerals in this coun-

try; yet this is exactly what occurs when price ceilings for the sale of domestic products are fixed at an amount which is less than the price at which comparable foreign products are permitted to be sold within the United States. Therefore, we urge that if price controls are to be continued on critical metals that the Price Stabilization Law should be amended to provide that no price ceiling on domestic products should be less than the price at which comparable products which are produced abroad are permitted to be sold within the United States.

Except for emergency conditions we urge that the domestic minerals industry be allowed to develop and expand its activities under the traditional free enterprise system without government controls and restrictions.

STOCKPILING

We approve and have urged consistently the stockpiling of metals and minerals essential for defense and emergency needs. But we believe the most efficient and economical procedure is to stockpile when output exceeds demand and that it is in the national interest to adjust or suspend stockpiling purchases during a period when critical shortage of metals causes dislocation of production in defense and essential industries.

National security requires a healthy domestic mining industry with ample productive capacity and experienced working forces. Our greatest protection is industrial strength. We recommend maintaining adequate capacity for the production of strategic and critical metals and minerals within the United States.

The continued operation of prospectors and small mining concerns is important because these smaller operations provide a pool of specialized knowledge and trained manpower available for the expansion of minerals in the event of an emergency. Their activities also are the source of new mine discoveries of consequence.

We recommend a national policy of stockpiling strategic and critical materials on a permanent basis and the provision of adequate funds at all times for orderly purchases for possible emergency needs.

We recommend that no withdrawals from stockpiles be authorized except in a declared emergency when national security clearly requires release of a particular material.

TARIFFS

Experience has shown that our people should not be left dependent on foreign ore reserves as a source of supply in an emergency, however important it may be to import some metals and minerals to supplement domestic production and fill our stockpiles with materials in which we are deficient. World political conditions as well as the hazards of possible air and submarine warfare support this conclusion.

We recommend, therefore, that Congress exercise its authority over tariffs to be administered for the welfare of the American people and provide reasonable protection when needed against competition from low foreign wages and depreciated currencies.

We endorse the principle of a flexible tariff.

We oppose inter-governmental commodity agreements that call for state control over industry, or involve international regulation of production, distribution and prices.

REPORT OF PRESIDENT'S MATERIALS POLICY COMMISSION

The President's Materials Policy Commission has performed a public service in showing how free enterprise has developed American natural resources, in summarizing a vast amount of information pertinent to the mineral industries, and in emphasizing the importance of a consistent mineral policy.

We commend the Commission for:

(a) Recommending acceleration of topographic and geologic mapping of the United States and Alaska.

(b) Recognizing the principle of percentage depletion for metals and minerals.

(c) Advocating removal of the present limitations on the expensing of exploration costs applicable to minerals.

(d) Appreciating the necessity of encouraging the participation of American capital in the exploration and development of foreign mineral resources.

(e) Recommending that the well-being of small mining enterprises and prospectors be promoted.

It is difficult to reconcile the Commission's endorsement of the free enterprise system, which has created our high standard of living, with its belief "that special consideration should be given to three types of arrangement—

(a) the multilateral contract;

(b) international buffer stocks;

(c) international buffer stocks combined with limited quota arrangements"

which are part and parcel of an international plan to manipulate prices, production and exports for the assumed long-range benefit of the world. The history of domestic and international trade provides ample evidence of the failure of such well-meaning, but misguided attempts at government and private manipulation.

We strongly urge a return to free enterprise and emphatically oppose a controlled and regi-

mented economy. We are forced to disagree with many of the Commission's recommendations, conclusions and beliefs. Particularly we believe that:

(a) Direct exploration activities by government should not be undertaken on private lands.

(b) The Mining laws should not be revised to introduce a leasing system for metal miners or abolish extralateral rights.

(c) American taxpayers' funds should not be used to explore private lands in foreign countries.

(d) A Defense Materials Procurement Agency should not be established as a permanent instrumentality of the government.

(e) Successor government agencies should not be established when the present emergency agencies are dissolved.

(f) Business risks which the Export-Import Bank is unwilling to assume should not be transferred to the American taxpayer.

(g) Legislation should not be enacted to furnish government loans for foreign mineral enterprises, coupled with authorization for government to enter into management contracts.

(h) Permanent legislation should not be enacted authorizing the unilateral elimination of import duties by the Executive Branch wherever the United States is substantially dependent on imports of metals or minerals.

(i) The "Buy-American Act of 1933" should not be repealed.

INTERNATIONAL MATERIALS CONFERENCE

We deplore the participation of the United States in the International Materials Conference and we approve the action of Congress in limiting the representation of the United States on the International Materials Conference to that of an observer.

PUBLIC LAND POLICY

Eighty years ago this year Congress enacted the mining laws of the United States relating to the production of hard minerals and metals. The philosophy of this legislation was that in exchange for enterprise, effort, hardships, and uncertainty of return, the prospector and developer of minerals should have free access to minerals and metals in the public domain and an exclusive title to what he could find and produce. Congress realized that the welfare of the nation in general, and of the western states in particular, would depend upon the successful and profitable discovery and production of minerals through private enterprise. There was no thought of exacting royalties for the national government or imposing Federal regulation upon the miner. Over the years the wisdom of Congress in passing these laws has been demonstrated. The mineral production of the United States has not only contributed in a very large measure to the national economy and national welfare, but in time of war it has provided the sinews necessary to protect the safety of the nation.

We are again confronted with a program emanating at this time from the President's Materials Policy Commission, involving substantial changes in these laws. Alternatively the Commission suggests the introduction of a leasing system or amendment which will substantially restrict the mineral locator's title to surface rights and his tenure and freedom of action in developing his claims. We have examined these proposals and the statements on which they are based objectively. We conclude that they are based on the socialistic concept that public lands containing minerals must be disposed of under such terms as will insure not only a direct royalty to the Federal Government on production, but also its strict control of the miner's operations. We oppose this concept in its entirety and adhere to the sound policy under which our mining laws are framed and have worked successfully. Multiple uses of the surface by miners, timbermen, stock grazers and resort holders are impracticable and even in theory could exist only under the most intensive bureaucratic regulation. Automatic forfeiture of the miner's title under administrative regulation without benefit of his day in court is contrary to American concepts of justice.

The argument that existing mining laws permit fraudulent locations and seizure of the public domain for purposes not connected with mineral production does not support the remedy suggested in the report of the President's Materials Policy Commission. The history of our public land laws is replete with vigorous prosecution by past administrations of fraudulent mineral locators, timber locators, and usurpers of the public lands of all categories. The courts and our present judicial system have been found adequate to protect the public through criminal prosecution and injunctive relief against this type of illegal and fraudulent appropriation of public property. We demand that the Bureau of Land Management and Department of Justice utilize these judicial procedures in fraud cases. On the other hand, we express our unalterable opposition to the substitution of a leasing system for the present mining laws and to the amendments proposed in the report of the President's Materials Policy Commission.

We recognize that there have been abuses of mining claim locations which have invaded the rights of others. Illegal locations should have been corrected by action of the Bureau of Land Management, but we believe the Bureau has deliberately created a chaotic situation which seems to require consideration. Therefore, we urge that

an attempt be made at local levels by inter-industry discussion with other users of public lands, with a view to cooperating and presenting a united front on conditions which will eliminate the abuses.

We oppose any moratoria on annual labor requirements. We urge acceleration of the procedure for issuance of mineral land patents and the revision of administrative regulations under the grazing homestead act so as better to protect bona fide locators of minerals reserved under these acts in their rights to adequate surface water and access easements for the development of the reserved minerals.

We commend the Secretary of the Interior for recognizing the importance of mineral production by establishing the Minerals Section of the Bureau of Land Management. We urge prompt implementation of this division by employment of adequate personnel to expeditiously act on all cases arising under the mining laws.

GOLD AND MONETARY POLICY

Restoration of the gold standard with gold and the dollar freely interchangeable at a fixed ratio should be a clearly defined objective of our Government. Until this is accomplished, efforts to stop waste and extravagance and to check inflation are not likely to be fully effective. With the right to convert currency into gold, the power to enforce sound monetary practices would again be in the hands of the people and extreme commitments against the future of the dollar would be discouraged.

Our nation has the financial strength and the power to take the first step toward reestablishing the gold standard as the monetary system of the world. With recognition of the value of gold itself as measured by its relation to prices, the ratio of gold and the dollar should be fixed at a natural level that could be maintained and that would provide a base to which the currencies of the world could gradually be related as their economies became adjusted.

In accordance with these views, we urge:

(1) That the gold standard be restored at the earliest practicable time;

(2) That the restrictions on the purchase, sale and ownership of gold by American citizens be removed; and

(3) That Congress fix the ratio at which the dollar and gold are to be made fully convertible and determine other technical procedures involved in the restoration of the gold standard, after receiving the recommendation of a Commission of its creation, to which men skilled in appraisal of the world's potential gold supplies as well as men of competence in domestic and international finance and trade should be appointed by designated Governmental authorities.

SILVER POLICY

We endorse the existing Federal policy with regard to the acquisition of silver for its beneficial influence upon the base-metal mining industry, as well as for its traditional service in providing a base for a portion of the nation's currency.

MINE FINANCING

We are encouraged by the current efforts of the Securities & Exchange Commission to revise its regulations covering small mine financing. However, before adopting the proposed revisions we urge the Commission to give careful consideration to suggestions of mining industry associations representing those interested in facilitating public financing of primary mining ventures.

TOOLS FOR PRODUCTION

Mineral and metal production are dependent upon an adequate and steady flow of production materials and maintenance, repair and operating supplies. We commend the efforts of the Defense Materials Procurement Agency and the Mining Machinery Division of the National Production Authority to obtain the needed materials. We urge that current policies of the D.P.A. and the N.P.A. be changed to recognize that mining machinery, repair parts and mine operating supplies are basic to the economy. We urge that a special priority rating be provided for mining and mining equipment manufacturers—such as highest priorities on a suitable proportion of total allocations—so that the needed steel, copper and aluminum will be available in sufficient quantities and in sufficient time to maintain mine output and expansion to meet the needs of the national security.

GEOLOGICAL SURVEY—BUREAU OF MINES

These two agencies dealing with the affairs of the mineral industry are well organized and staffed with able and dedicated technicians who year after year perform services of a high order of excellence.

We again state our respect for their achievements and our confidence in the integrity and competence of their personnel. The Geological Survey, especially, both as to organization and administration, is a Federal agency that might well be regarded by the Congress and the President as a model for conservative and efficient operation of a bureau in the interest of getting the greatest results from the least expenditure of the taxpayers' money.

We reiterate our suggestion of previous years that the function of mineral land examiners be

transferred to the Geological Survey and that the Survey's findings as to sufficiency of mineral discovery under established judicial definitions be binding on both mineral claimants and the Federal Government.

On the other hand, we oppose transfer of the Branch of Conservation of the Survey or any of its activities from the Survey to the Bureau of Land Management.

We restate for emphasis our conviction that rapid advancement of the topographic and geologic mapping by the Geological Survey is vital to the search for and development of our mineral resources.

MINE SAFETY

We reiterate our previous position that the safety of men in mining operations is a primary responsibility of the mine operator and a matter for State regulation. We heartily commend the work of the Bureau of Mines for its service to the mining industry on developing and disseminating improved techniques in mine safety. This work deserves adequate financial support.

WATER AND AIR POLLUTION

Water and Air pollution problems are local, not national, in their nature and scope. What may constitute a nuisance in densely populated States does not necessarily constitute a nuisance in sparsely populated areas. Functions of the United States Public Health Service under the Federal Water Pollution Act should be limited to experimental studies, improvement of techniques, and intelligent education of industries and of state and local community authorities as to practicable means of preventing water pollution. Solution of these problems and the enactment of laws or regulations where necessary to effect such solution, should be left to industry and to local authorities. This applies equally with respect to the problems of air pollution.

GOVERNMENT REORGANIZATION

We strongly urge the Congress to enact into the law the recommendations of the Hoover Commission in the interest of better and more economical management and operation of the executive branch of the Federal Government. However, we except from this statement of policy the recommendation that the Bureau of Land Management be transferred to the Department of Agriculture. This we oppose.

More than ever, there is a pressing need for application of the principles of the Hoover Commission reports in order to control and direct the appalling growth of the Federal bureaucracy, and to bring about at the earliest possible moment sound management with economy and efficiency in every military and civilian agency at home and abroad. Reactivation of the Hoover Commission to deal with the reckless expansion of bureaucracy and costly personnel in the Federal Government is indicated to strengthen its previous recommendations and to inform the public of the danger of this drain on the resources of the taxpayer.

German Coal Planer

(*Continued from page* 59)

for conventional mining. Second, the chain pillars left in the entries of the longwall area were larger than may be necessary, but the extra size was a factor of safety. Further experimentation may show that a longer longwall face could be used advantageously, and that the extra-large pillars in the butt entries may not be necessary. If a longer face proves satisfactory or smaller chain pillars in the butt entries provide the proper safety, either change would increase the recovery in a longwall panel.

Ventilation

About 16,000 cfm of fresh air entered the panel from the main air intake through the two air-course entries adjacent to the belt entry; most of this was then coursed along the face to the opposite side of the panel. The remaining air from this split passed through the bleeder room along the inby end of the panel and into bleeder return airways. In addition, about 6000 cfm entered the panel on the outby side of the experimental block. The air was coursed through the two entries nearest the block. The third or outby entry of this group was a return airway and carried part of the air from both splits. Most of the return air was coursed through the two entries adjacent to the outby side of the mined and caved area and into the bleeder return-air system. In all, about 22,000 cfm entered the panel through the two splits; of this quantity, 10,000 to 12,000 cfm passed along the working face. As little methane gas is liberated in this mine, the volume of air provided was adequate.

Operation

The planer was operated one shift a day. The panel belt conveyor was shortened and the control panel moved when necessary, by a third-shift moving crew, which did similar work for the conventional mining units. As this third-shift moving crew was not regularly assigned to the planer, the number of man-shifts worked by the crew was not included in the summary of the results.

First Shift:		
Foremen	2.0	
Operator	1.0	
Crib men	1.7	
Jack setters	19.3	
Jack robbers	4.0	
Headpiece cleaners	2.0	
Tailpiece cleaner	1.0	
Boom man	1.0	
Belt men (clean-up)	1.3	
Total, first shift		33.3
Second Shift:		
Lubrication, maintenance, and supplies	4.0	
Miscellaneous	0.5	
Total, second shift		4.5
Total, both shifts		37.8

Immediately after the first main-roof break, when the wood cribs were used in conjunction with the jacks for roof control, additional jack setters were employed, and production increased. During the peak production for 15 consecutive days, the average regularly assigned crew was comprised as above.

HAULAGE WAYS Jr.

How a Lump of Coal Traveled 20 Miles------- *Without Moving!*

● "Controlled Slack" in O-B Automatic Mine Car Couplers pays off in smoother trip movements, less spillage, and clean haulage ways at Vesta Mine No. 5 of the Jones and Laughlin Steel Corporation. Vesta No. 5 officials demonstrate their smooth haulage in a simple, surprising test. They set a lump of coal on the ledge of an empty car in an inbound trip, and ring it with a chalk line. When the car returns to the dump, the lump is still on the car ledge, within the ring. This performance is made more impressive by the fact that some of the working places are 10 miles from the dump. Thus the marked lump makes a round trip of 20 miles without being disturbed.

O-B Automatic Mine Car Couplers make this performance possible. Tough, resilient rubber draft gear provides controlled slack for each coupler installation. It absorbs the haulage jolts and jerks, allowing cars to start and stop without shaking the load.

Find out what "Controlled Slack" can give to your haulage operation. Write to Ohio Brass Company for complete information on O-B Automatic Mine Car Couplers for your cars!

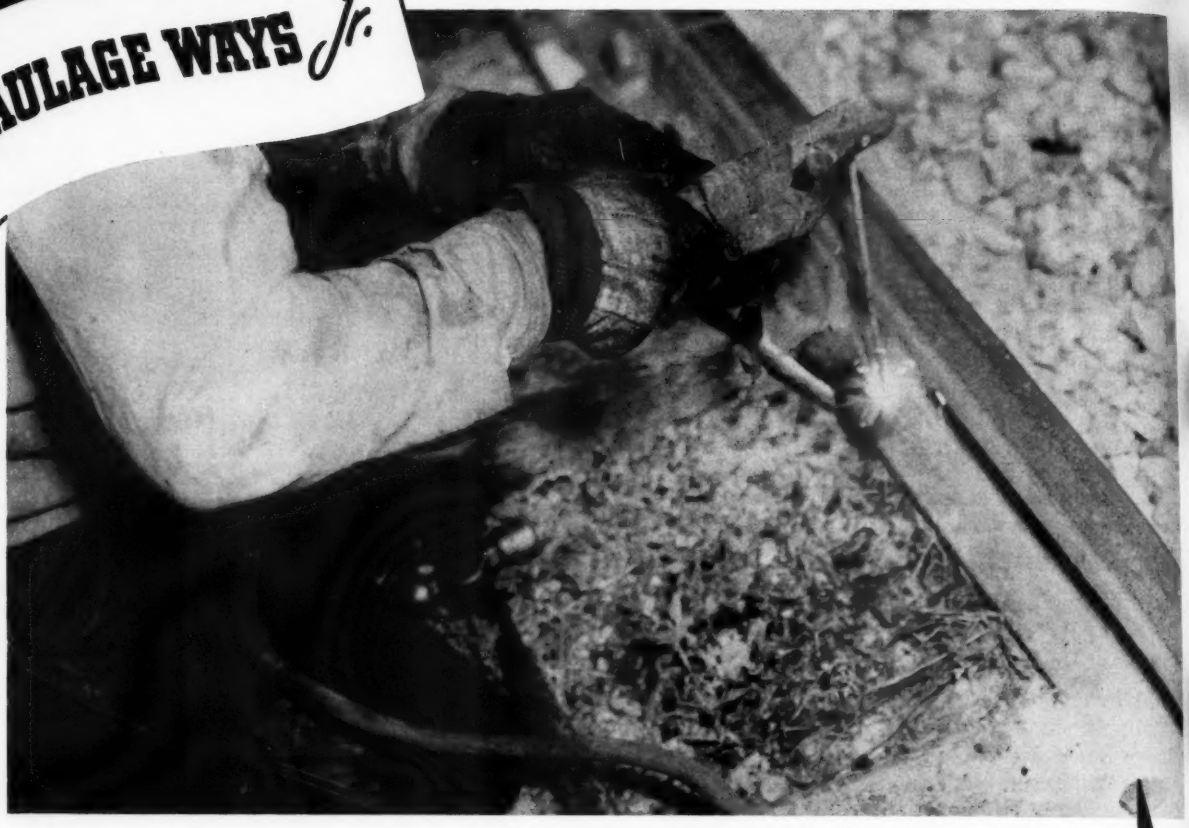
Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Marked lump of coal makes 20-mile round trip without being disturbed, because O-B Automatic Mine Car Couplers absorb haulage jolts and jerks, allowing cars to start and stop without shaking the load.

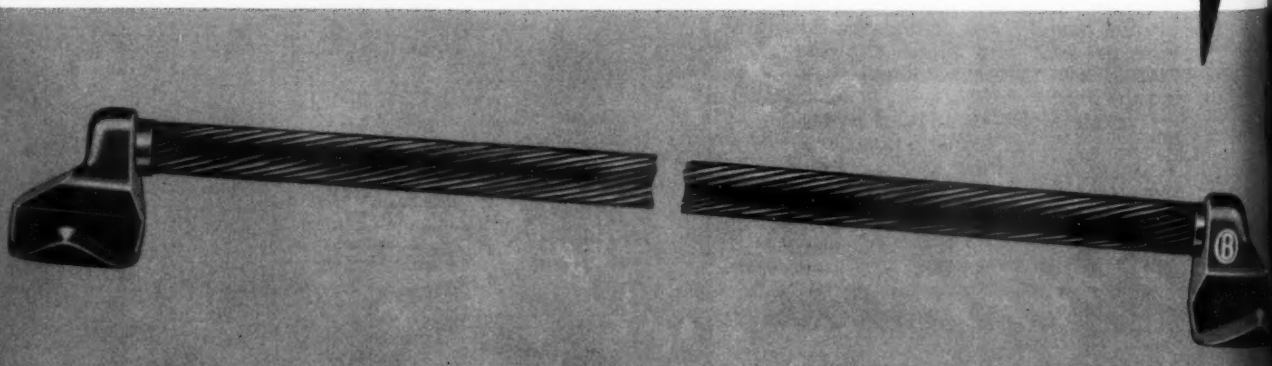
HAULAGE WAYS *Jr.*



New AW-22 Rail Bond

Quick, easy welding • Lower terminal resistance • Over or under base installation • Reclaimable

SEE HOW THESE BENEFITS WORK FOR YOU



WELDING EASE

Angular shape of the AW-22 Bond terminal makes open, accessible welding paths. There is no interference to welding rod movement from the rail head. This is true whether the strand is above or below the rail base.

Many welders find that only one head is necessary for a strong, permanent weld. Welding area is easily reached because of the wide angle between the rail surface and the edge of the terminal.

OVER OR UNDER BASE

Clip-shaped terminal holds rail securely before and during welding. Under-base installation gives terminal good protection from derailed wheels, dragging equipment, and the like. O-B Type AW-22 Rail Bonds are used for cross-bonding, too.

RECLAIMABLE

Reclaiming AW-22 bonds with hammer and chisel does not damage the terminal. The reclaimed terminal shown here needed no dressing or repair before being used again.

LOWER RESISTANCE

Angular shape of the terminal shortens the rail-to-copper electrical path, minimizing terminal resistance. Copper strand runs *through* the terminal; is welded to the terminal on its outer face. Thus the weld between strand and copper is *as close as possible* to the weld between the terminal and rail.

Talk to your O-B representative, or write to Ohio Brass Company, for complete AW-22 information. Ask for Publication 5767-M.

Ohio Brass

MANSFIELD OHIO, U. S. A.

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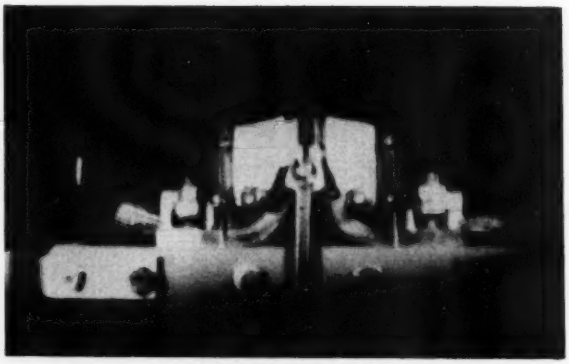
What goes on here?



Type-R Switch in closed position

Interrupting the Load

O-B Design Engineers recently put an O-B Type-R Roller Switch through its paces before the all-seeing eye of a high-speed movie camera. Just curious! They wanted to know exactly what happens to the switch roller and contact springs when the switch opens on high-voltage current.

As a result of their curiosity, the switch design was changed to give better-than-ever load-interrupting action. Out of a routine check came a way to improve an already excellent switch. It's another example of the continuous testing in O-B laboratories to make good products better.

All this is just another way of saying that every O-B product you buy is "The BEST we know how to make!"

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HAULAGE WAYS Jr.

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Did you see the Big September Roof Bolting Issue of O-B Haulage Ways?

It was a dandy – 20 full pages of up-to-the-minute information on roof bolting techniques and equipment. If you missed your copy, or would like additional issues, fill in the coupon at the left and send it to Ohio Brass Company.

Abstracts of Convention Papers

On the following pages will be found brief abstracts of the convention papers. It was manifestly impossible to cover more than a few highlights of each of the 83 excellent addresses delivered at the Convention. Many of them will appear in fuller form in this and subsequent issues of Mining Congress Journal.

PANEL DISCUSSION—"PALEY COMMISSION" REPORT AND NATIONAL MINERAL POLICIES GENERALLY

Session Chairman

HOWARD I. YOUNG

President
American Zinc, Lead & Smelting Co.
President, American Mining Congress

Discussion of Paley Report

Members of President's Materials Policy Commission and Industry Leaders exchange views on the Commission's Report

ARTHUR H. BUNKER

President

Climax Molybdenum Co.
and Member of the President's Materials Policy Commission

WHEN the President established the Materials Policy Commission he outlined in a general way the problem which he wished to have the Commission study—"the broader and longer range aspects of the nation's materials problem as distinct from the immediate defense needs."

The President left us a great deal of latitude and freedom on how we would deal with this extensive subject.

The Commission decided that the nature of the assignment would require that the problem be examined on a very broad front and felt that it was reasonable to try to peer 25 years into the future. It was assumed that for this period there would be no all-out war, but continuing international tension, and consequently continued maintenance of an active rearmament program.

We then addressed ourselves to describing our general beliefs. First—we shared the belief of the American people in the principle of growth.

Second—We believe in private enterprise as the most efficacious way of performing industrial tasks in the United States. As we see the future, the coexistence of great private and public strength is not only desirable but essential to our preservation.

We think the over-all objective of a national materials policy for the United States should be to insure an adequate and dependable flow of materials at the lowest cost, *consistent* with national security and with the welfare of friendly nations.

In preparing the report the Commission obtained all possible advice and counsel from industry and other sources outside of government.

The first phase of our work was the practical matter of establishing estimates and assembling data. This required a general estimate of the size of the United States in 1975; the population, the total working force, the length of workweek, the rate of growth. We obtained many calculations showing wide variance, but we chose, we believe, a conservative middle course.

The assumptions of this middle course are a population of 193,000,000, a working force of 82,000,000, and a workweek 15 percent shorter than today. We have assumed a rate of growth for the U. S. economy roughly equal to our growth in the past, or about 3 percent a year. This all would mean that our gross national product would about double by 1975. It would not, however, mean a doubling of our need for materials. Past experience has taught us that each dollar of raw materials tends to support increasing amounts of goods and services.

Next we turned the clock back and looked at the history of the past 50 years to see what facts it might substantiate. As the facts of the 1900-1950 era were compiled, they showed: with 9.5 percent of the world's population and 8 percent of the land area, we consumed, in 1950, one-half of the world's raw materials. It told us that since the beginning of World War I, the United States alone had consumed more goods than had been used throughout the whole of previous civilization. At the beginning of the

century we produced 15 percent more materials than we consumed, and in 1950 we produced 10 percent less raw materials than we consumed. The trend in consumption was strongly upward. If this trend continues until 1975, we will need to import 20 percent of the raw materials we consume, or three times the volume imported in 1950.

From 1900 to 1950 the population of the country doubled, but our material output expanded five-fold.

The President had requested that we examine the facts and assist him by recommendations "in formulating a comprehensive policy." While there has been no materials policy as such, the federal government has certainly taken many steps that influence prices, the availability of materials, and the rate of production, but they are not derived from any over-all consideration of the total problem, to serve the dynamic demands of our peace time economy, or to provide for those very different conditions of supply and requirements that are the basic conditions of national security.

The existing activities of the Federal, State, and local governments having a bearing on the materials problem form an extensive and complex pattern. Strictly speaking they are but a loose array of measures which influence the nation's present and prospective materials position and for security reasons have used such devices as market guaranties, development grants and loans, long-term purchase contracts, and rapid tax amortization.

We believe the task of overcoming the materials problem is far greater than merely locating enough physical resources. A materials policy, broadly conceived, must provide a framework for public programs, and for private policies and actions, all moving harmoniously toward the same national objectives. It is the Commission's belief that the bulk of the task of insuring adequate future materials supply can best be carried out by private business under the competitive market structure, operating within broad policy outlines which it is the responsibility of government to provide.

It is our belief that the recommendations of the Commission do define a policy in broad outlines, but do not intrude or encroach upon private enterprise. We have suggested that the government do a number of things which in the interests of national security and economic growth we believe must be done promptly, and for which we see no incentive to activate private enterprise.

We recognize that our recommendations are appropriately the area of debate. We hope that these problems will get your serious, thoughtful, and careful attention. We state very early in our report—"Clearly a task of such scope and complexity cannot be completed in one attempt, nor can it ever be safely regarded as complete. The five volumes of this Commission's report are offered only as a beginning. The most important conclusion this Commission presents is this—that the job must be carried on cooperatively by government and private citizens, not periodically at wide spaced intervals, but day by day and year by year." It was upon this basic concept that the report was written.

ANDREW FLETCHER
President
St. Joseph Lead Co.

THE difficult problem with which the Paley Commission was faced is appreciated, as no one can foresee with any great competence, what our economy will actually be in 1975.

I intend to base my comments about the Report, on Lead, the metal with which St. Joe is most familiar. The Commission foresees an annual lead deficit of 900,000 tons in 1975—by "deficit" is meant the difference between consumption and domestic mine production plus recovery from scrap. St. Joe's estimates support a "guess" of a probable 200,000-ton deficit—a reduction of 700,000 tons per year. Whether we or the Commission are even reasonably close to a correct deficit estimate, would be only of academic interest to prove that different figures and assumptions give an entirely changed picture—if it were not for the fact that the Commission's forecast is subject to severe criticism. Furthermore, their 900,000-ton deficit may have frightened them into recommending the adoption of such alien control measures as multilateral government contracts, buffer stocks, quotas, etc., which if adopted, will result in the socialization of the domestic, as well as the world, mining industries.

The reason for the enormous difference of 700,000 tons per year between St. Joe's forecast and that of the Commission can be briefly summarized as follows:

1. *Consumption:*

The Commission estimates that the 1975 lead consumption will be 1,950,000 tons. They have arrived at this figure by using 1950 as a base, with a projection of increased or decreased consumption of end uses over the next 25 years. We criticize the choosing of 1950 as a base, as this year happens to record the highest consumption in the history of the industry.

Lead is one of the oldest known metals, and its various properties are well established. Consequently, it is not surprising to find its per capita consumption at a fairly steady figure, year after year. For the last ten years the per capita consumption has averaged 14.7 lbs. Using this figure and the Commission's anticipated population of 193,000,000 in 1975, we arrive at a projected consumption in that year of 1,420,000 tons—approximately 500,000 tons less than the Commission's figure.

There is another reason for doubting the Commission's lead consumption forecast. From 1925 to 1950 the population growth was about 36 percent, while lead consumption grew 33 percent. But, for the next 25 years the Commission assumes a lead growth of 61 percent, although they estimate a population growth of only 27 percent. Therefore, using past experience as a base, the lead consumption would increase 25 percent, not 61 percent over the next 25 years. We in the lead industry are constantly striving to increase our markets, so I think a consumption of around 1,420,000 tons is a reasonable forecast.

Another pertinent criticism—as an apparent justification for using the 1950 consumption of 1,212,000 tons as a base, the Commission refers to the war year of 1943, and points out that the consumption was 1,330,000 tons. However, the Commission made an error in overlooking the fact that nearly 300,000 tons of the 1,330,000 tons were stockpiled not consumed.

2. *Production:*

(a) In 1948, at the request of the National Security Resources Board, we made an estimate of world lead production for the period up to 1970. We communicated with the major lead producers throughout the world. The estimate which was arrived at for the United States was 375,000 tons, which is 75,000 tons in excess of the 1975 Paley Commission's estimate of 300,000 tons. We anticipate no decline between 1970 and 1975, provided unrealistic governmental controls become no worse than have been experienced. Our estimate of future foreign production is considerably in excess of that of the Paley Commission.

(b) For scrap recovery the Commission has again used 1950 as a base, but their figure is in error, as the actual recovery in that year was 482,000 tons—not 428,000 tons as stated. It seems to us that the 1975 scrap recovery might amount to 850,000 tons per year, which is around

60 percent of St. Joe's estimate of 1,420,000 tons for prospective lead consumption.

3. *"Deficit":*

The total of our estimated primary production of 375,000 tons, plus the potential 850,000 tons from scrap is 1,225,000 tons, which when subtracted from the consumption of 1,420,000 means that around 200,000 tons would have to be made up by imports. This figure is far less than the actual imports which have averaged 337,000 tons per year over the last 12 years. We therefore see no reason why lead consumers, or any one, should be alarmed about the future lead supply.

SIMON D. STRAUSS
Vice-President
American Smelting and Refining Co.

MY initial discussion is confined to the Commission's recommendation that international buffer stocks should be created by our own and other governments for the purpose of stabilizing raw material markets.

The Commission believes that wide swings in raw materials prices discourage investment in new ventures and that consequently capacity tends to be inadequate to meet the peak levels of demand at times of international stress. In addition, it argues that stabilizing raw materials prices would assist the economy of the so-called under-developed countries, thereby reducing the hazard of political disturbances and perhaps preventing expropriation of foreign investments such as has occurred in the Near East and in Latin America.

This is tempting bait to our industry.

But before we leap to the bait, let's examine what is really entailed. Two questions immediately occur:

(1) Is the plan really feasible? Can it be made to work as the Commission suggests?

(2) Further, regardless of the answer to question one, is the plan compatible with the spirit of free enterprise?

Let us deal first with the feasibility of the scheme. The Commission's report suggests that these buffer stocks would be operated by an international group in which both producing and consuming countries would participate and to which both would contribute financial support. Each country's contribution might be determined, the Commission says, by its relative share in world exports and imports.

Would each country's contribution be in its own currency? When the buffer stock buys, would it pay for its purchases in the currency of the country from which it buys? When it sells, will it sell in the currency of the country to which it sells? If so, the weak currency will soon drive out the strong.

The Commission states that the aggregate cost would not overtax the resources of participating countries, but gives no estimate of the actual amount required. The amount would have to be at least as great as that involved in the United States stockpile effort, now estimated at over nine billion dollars. Further, I would say that the resources of the participating countries are already overtaxed without any buffer schemes. Another nine billions cannot be shrugged to one side as of no moment, but probably should not be the major consideration.

A more serious objection is the improbability that the fifty-odd nations which will be involved in the management of the buffer stocks can be brought together to operate in an effective or prompt manner.

The Commission describes the buffer stock as being based "on reasonable anticipations of the long run price of the material under control . . . ceiling and floor prices would be based on the best estimates of future production and consumption . . . periodically modified in the light of actual market behavior and revised forecasts."

The prospectus makes it sound as if nothing but reason and light would govern the decisions of the buffer stock authorities. Political considerations would be certain to influence the decisions. On an international scale favoritism would have results incalculably more damaging because with their power to set minimum and maximum prices and to withhold or market stocks running into the hundreds of thousands of tons the central authorities would have undisputed control of the market.

Furthermore, how good is governmental judgment likely to be as to the long run prices of the materials under control? My point simply is that when a government or a group of governments errs, the effect on the market is infinitely more serious than when a private buyer or seller does so. The British buying of lead and zinc in 1951 and selling in 1952, far from helping to stabilize metal markets, actually has tended to increase instability.

A governmentally-operated international buffer stock—if undertaken—would hang over the metal markets like a sword of Damocles. Decisions would be long delayed in the making and while uncertainty over them existed neither producers nor consumers could plan or operate in a normal way, dreading the possible disastrous financial consequences of misjudging the buffer stock's programs.

The buffer stock proposal is advanced by the Commission on the theory that it is difficult for private capital to operate in a market in which prices fluctuate widely; it would be intolerable, however, for private capital to work in a climate in which the entire investment is in constant jeopardy because of potential political decisions of an organization responsible to no single nation or to no single group of stockholders.

All efforts in the past at international controls over raw materials have been a failure when these efforts have been made by private cartels; the substitution of politicians for industrialists does not make the cartel theory any more palatable.

IRA B. JORALEMON
Consulting Engineer
San Francisco, Calif.

THE underlying theme of the report is that the United States has become a Have-Not nation, and must rely on other parts of the Free World for an increasing proportion of its raw materials. The fact is that the world is a Have-Not world. All parts of it must rely on trade with other parts for a large portion of the raw materials or commodities needed for a high standard of living.

The statistics given in the report bear out this conclusion, though many of the forecasts are at variance with it. The facts show, not that we lack raw materials more than other parts of the world, but that we use them with a reckless prodigality that no source of supply could keep up with. If the rest of the Free World approached our

living standard, consumption of mineral raw materials would increase six times. There isn't any such supply in the world. The report recognizes this, but assumes that our use of metals will continue to increase, in proportion to population, more rapidly than that of other parts of the world. This would inevitably cause increasing hatred against us. It is the real isolationism. It can result only in an eventual war.

A glance at the projected future use of metals in and outside of the United States emphasizes the disparity. Charts in the report show a definite trend of increasing domestic consumption of the principal minerals and metals in the past 50 years. However, if allowance is made for the greatly reduced consumption during the great Depression and the fantastic peak of war and post-war use of materials in the 40's, it is evident that the curves of domestic consumption of most of the vital raw materials are already beginning to flatten.

The forecasts in the charts for projected future consumption pay no heed to this tendency. Instead they assume a constantly growing rate of increase in domestic consumption.

The fantastic domestic use of the principal raw materials foretold by the Commission is best illustrated by the fact that in the next 25 years they think our population will increase by 27 percent, while our consumption of vital materials will increase by 100 percent.

In contrast with this explosive domestic use, the Commission forecast for increase in foreign use of most materials is comparatively moderate. This is in spite of the fact that the rest of the world must build up its capital plant if it is to attain a living standard that is even remotely comparable with ours.

Our only hope of continued security lies in the friendship of the other Free Nations. The Commission report recognizes this. Its forecasts allow a greater increase in consumption of key commodities abroad than at home, and that such a relative gain is necessary if we are to live in a friendly world. It does not show, however, that while total quantities of these materials used abroad will increase more rapidly than those used in the United States, the situation is completely reversed if relative populations are taken into account.

It is, in effect, a dole that the Commission would allow other nations. Through financing of new foreign developments, loans for equipment, long term purchase contracts and limitation of price fluctuations by United States government agencies, the Commission advocates a "Planned Economy" on a scale that has never been dreamed of. It plans to bring about a rapid increase in foreign production of raw materials we want for our fantastic demands, to take what we desire, and to let them have what is left. The effect of this policy is shown graphically in the charts of the Report. The Copper chart shows that by 1975 foreign production is to increase by 1,400,000 tons per year, and that we will take 550,000 tons of the increase in addition to our present imports of 350,000 tons. Foreign iron ore production must increase by 115 million tons, of which we will take 70 million tons more than our present imports. Lead and zinc show just as clearly that we plan to grab the lion's share of increased foreign production.

In all save a few materials such as nickel and tin we would be far better off than the rest of the world even if we had to depend on domestic sources alone. Our boasted superiority in technology has in the past made it possible for us to use lower grade orebodies than those which are mined abroad. A continuation of technological progress should reduce our dependence on foreign countries to a healthy interchange of goods.

Such normal trade is far better than domineering control by government agencies. It promotes good feeling on the part of other nations rather than hatred. Unlike government financed development, when a private company becomes too grasping in the operation of its foreign properties, it can be controlled by law or even confiscated without causing a war. It is far more important for us to keep friends among the nations on our side of the Iron Curtain than it is to speed up an increased standard of living at home at the expense of that abroad.

Perhaps the worst feature in the world-wide planning that is advocated by the Commission is the self-satisfied claim that it is based on "enlightened self interest." Enlightened self interest is just a fancy phrase for selfishness you think you can get away with.

By HON. HENRY C. DWORSHAK
U. S. Senator from Idaho

THE report of the President's Materiels Policy Commission will be submitted to the Senate and to the House of Representatives for hearings and for discussions.

There is a possibility, of course, that in the coming months the administrative agencies in the Federal Government and the Executive Department may arrogantly assume the responsibility for implementing some of the recommendations made by the Commission. That has been done in the past, and it may be done again in the future.

What reception will Congress give this report? We don't know, but it will be a challenge to the legislative branch of Government, and whatever emanates from the hearings to be held in the next session of Congress will have a beneficial effect upon policies and planning which may have far-reaching effect not only in national preparedness, but in utilizing advantageously and to the maximum extent those natural resources with which our country is blessed.

The Commission in the interest of expanding world trade seeks to justify repealing our tariff laws and the "Buy American Act," and contends that a device such as the International Materials Conference will remove barriers to trade.

The International Materials Conference was never authorized specifically by the Congress. I think that the State Department deliberately circumvented Congressional mandate, and I question whether the Government is authorized to permit this U. N. agency to thwart free trade.

The Commission also recommends that the Reciprocal Trade Agreement Act should be carried forward and its authority expanded—the Commission believes. I happen to be one of only two United States Senators who voted against extending the Reciprocal Trade program within the past year. But it has always seemed to me that it has been a one-way program. Very infrequently has the United States been able to get any material benefits through the operations of the Reciprocal Trade program.

The Commission recommends legislation to authorize unilateral elimination of import duty on any industrial material whenever such action is in accord with the national interests.

Such tremendous power in administrative agencies would jeopardize free enterprise by subjecting a specific industry to the whims of Federal officials.

We have heard a lot of discussion about the stockpiling program. That's a moot question in Washington. While we all understand the mandate of the Congress in setting up stockpiles of essential materials upon which we may rely when foreign production is no longer available or materially cut down, it is difficult to get agreement among those agencies in Washington representing the Army and

the Navy and the Air Force and other civilian agencies of the Government.

In 1950, when prices of lead and zinc were depressed, we appealed to the Munitions Board to stockpile these minerals. There was no interest at that time, but when prices increased materially, the Government purchased these commodities. They were willing to pay more per pound for lead and zinc for the national stockpile, but when the industry was depressed and those minerals were available at low prices, there was little interest on the part of those charged with the administration of the stockpiling program.

Many conclusions reached by the Commission are illogical and highly discriminatory because they would give preferential treatment to the development of mineral resources abroad. Chairman Paley, in an interview printed in *U. S. News* recently, said this: "We encourage the government to take actions aimed at creating situations favorable to private foreign resources development."

This statement of Chairman Paley is an astonishing one and reflects the basic philosophy and thinking of the economist. Such policies overlook the likelihood that, if we rely on foreign production, and our domestic resources remain undeveloped, and we face the monopolistic practices and price gouging such as occurred in rubber, tin, wool, and other commodities in the past, particularly immediately following the outbreak of hostilities in Korea. For example, following Korea, when the armed forces needed additional wool for uniforms, the price of wool in Australia doubled within the space of a few weeks.

Too frequently that is the kind of cooperation we get from the countries abroad with whom we are cooperating to preserve a free world.

The keynote of the Commission's report is that emphasis should be placed on stimulating production abroad. I cannot agree with the Commission on such a conclusion while our own vast undeveloped deposits remain untouched.

If the United States becomes a "have-not" nation dependent upon imports, it will be the result of inept policies which discourage maximum use of American ingenuity and capital in the domestic mining industry.

HORACE M. ALBRIGHT
President
United States Potash Co.

MY own view of the Paley Commission Report is that it is one of the greatest accomplishments of a government agency in many years, certainly since the war. I regard the Commission's Report as a repository of facts, really encyclopedic in scope, and of the utmost importance to government, industry and agriculture, and for years to come.

I want to see our own mineral supplies increased and our own mining industry grow, flourish, and prosper. I believe these three things will happen, but not fast enough to meet all our needs for metals and minerals. It would be a grave mistake to give too much attention to the impact of this report in a year or five years from now on our industry or on the economy of the nation. This is a study of the materials situation for 25 years. The Commission was charged with the responsibility of arriving at general conclusions regarding our economy 25 years hence in the light of our supply of materials available, and then had to be very objective and could not bring in recommendations that in every respect would seem reasonable to us in the light of our situation today. I say that the Commission has done a magnificent job, written a superb, scholarly report, the very language of which commands respect in the reading of it aside from the scope and meaning of its words.

The report becomes at once a basic document certain to influence industry and government policy for many years to come.

As we have seen today, most, if not all of us here in the panel and in the audience, disagree with some features of the report, especially some recommendations relating to foreign trade policy and government controls, and some phases of government in industry.

(Mr. Albright also suggested that the industry establish a committee for the purpose of continuously studying the Commission's report and to suggest revision of conclusions and recommendations as the need arises.)

EVAN JUST
Vice-President
Cyprus Mines Corp.

TURNING to its tax recommendations, it should be a source of great satisfaction that the Commission has embraced almost entirely the remaining points of the program toward which the American Mining Congress, the National Minerals Advisory Council and many individuals have worked for many years. With such forthright endorsement of incentive taxation and of percentage depletion from such a source, we can expect a respite from the persistent attacks on percentage depletion which the White House and Treasury have conducted every time Congress has revised the Revenue Code.

Naturally, there will be some inclination within the industry to object to the Commission's recommendations.

In recommending that the limitation should be removed on the amount of exploration costs which can be treated as expense, the Commission has sponsored one of the most effective remaining possibilities of stimulating exploration. It is to be hoped that Congress will act on this suggestion as I am sure we all agree that the public interest would be served by an increase in domestic exploratory activity.

The Commission is also to be commended for urging certain new tax incentives toward American investment in foreign mining. The growing needs of our national economy point up very strongly the desirability of commercial control of raw materials we need from abroad.

If Congress adds the tax incentives recommended by the Commission to the substantial ones already embraced within the Revenue Code, it will be appropriate to ask ourselves if there is any reasonable basis for seeking additional tax incentives. The only criterion I can set up is to ask if the level of investment in new mining and exploration ventures is compatible with the public interest and, if not, are tax or other incentives the more appropriate?

As far as established, profitable mining companies are concerned, it seems to me that the addition of the Commission's recommendations to existing law leaves very little to ask in the way of tax benefits. Further incentives, if there is to be equity among taxpayers, should come out

of the prices asked for the output. No incentive is more effective than attractive prices for our output.

Considering that the established companies exhibit a preference for letting others conduct exploration in its earlier stages, further attempts to stimulate mineral development should be aimed at re-establishing an army of those eager to tackle the hazards of early-stage exploration.

Canadian depletion allowances are less than our own. Canada does not tax capital gains and it allows a 3½-year tax moratorium on new mines. Both these incentives are liberally administered.

The Commission considered the moratorium feature but dismissed it as unnecessary and too difficult to administer here. I disagree with this viewpoint on both counts. To restore that indispensable army of enthusiastic outsiders I would recommend both a tax moratorium on new producing properties and a limited exemption from taxation of capital gains obtained through mineral exploration and development.

E. H. SNYDER
President
Combined Metals Reduction Co.

I believe we should be grateful to those whose brains and energy went into the compilation of the report for the sole purpose of presenting a comprehensive analysis of our materials, but we should crush fine and screen dry for accurate sampling, the ground and theories planted in the report, especially schemes that would destroy our freedom or the system which has built our great nation, and that could possibly substitute therefor the controls of a super-state.

The report generated no fear in my mind that the nation's economy will be seriously cramped for any period in the foreseeable future by shortages of lead or zinc, except those that may be created by unsound activities of government. Even if the consumption estimates for 1975 were realized, I think the Commission did a very good job, considering the task they had in getting some basis for forecasting the next 25 years, and you have all been alerted as to the variations there might be in those forecasts.

I am strongly opposed to international agreements that in any way limit our sovereignty, control our production or consumption or the prices of our products.

Foreign production subsidized directly or indirectly by our Government can ultimately destroy a large segment of our domestic lead-zinc mining industry, and place our economy at the mercy of foreign cartels or governments.

The nation can ill-afford to condone violent fluctuations in metal prices, such as we witnessed during the past four years. I agree that buffer stocks might be a satisfactory solution. However, these stocks should be national, not international, and operated by regulations spelled out in detail by Congress; not left to the planners in the State Department or any other Government agency.

I think that Congress could define, using a commodity index, modified by the price of labor, the price at which metal should be bought and at what price it should be sold. Certainly I would not recommend under any conditions to make any agreement that involved international cooperation.

If we look at that problem for what it is, the peninsula of Europe without raw materials, with socialistic governments, who, in spite of low wage scales, can't compete with us in the markets of the world, must find some way to get raw materials from us without paying what they should pay for them.

One of the problems of the world has been beating down the prices of raw materials producing countries by virtue of control of markets. I see in all these plans a scheme on the part of the European nations primarily to beat down the prices of raw materials. You people who produce metals in the United States have that to beware of at all times.

Of course you know this report is strongly opposed to tariffs. I call your attention again though that a flexible tariff, established at a level that would permit perpetuation of the domestic industry, that would be a price that would not let every marginal mine operate at a profit, but one set and varied again with the commodity index and the cost of mine labor, would automatically take care of this problem, and not make it necessary for us to periodically shut our mines down, discharge our men, drive them out of the industry, and then get another shortage for our consumers on account of the time required to re-establish production.

I read carefully the fundamental concepts of the report and generally agree with them, but before advocating the less cost principle, we should have an answer to the question, "Less cost to whom—the American taxpayer or the consumer of metals?"

I am fundamentally opposed to subsidizing consumption. The producer should get the subsidy, not the consumer. If we must resort to subsidies, they should be paid automatically to all domestic producers, preferably graduated with increments of production.

The Commission recommendations as to loans, coupled with collective price contracts provide an unfair type of competition for those who maintain production without government help, and the domestic industry may be seriously hurt by surpluses created by such devices.

DONALD H. McLAUGHLIN
President
Homestake Mining Co.

I was rather surprised that in the Paley report more emphasis was not placed upon the need for an international monetary system based on gold as one of the very best methods of stabilizing international trade, correcting chaotic exchanges and really promoting the ends that we all have very much in mind.

The Paley Report performs an important service in directing attention to the major changes that have taken place in the nation's economy with regard to the production and consumption of raw materials. The significance of the transition from being an exporter of minerals and metals to dependence on imports for a critical part of the supplies needed for our expanding industry is still not appreciated or generally understood.

This is a very profound change and one that is likely to require considerable modification of procedures with regard to international trade, tariffs, and mineral policies from those that were satisfactory in the past.

There is also danger that the exaggerated consumption, or better, destruction, of resources in the current decade of war and extravagance has provided a false concept

of normal growth. Indeed, I rather fear that when the rearmament effort becomes less demanding, we may be faced with over-production of metals and minerals for a time which would be extremely troublesome.

With the affirmation of belief in private enterprise as the most efficacious way of performing industrial tasks in the United States, we will surely agree even though some of us may think that this concept was not consistently followed in all recommendations of the Commission.

The recommendations with regard to fact-gathering and analysis on the part of the Geological Survey and the Bureau of Mines and on the part of industry through the AIME deserves thought. If kept within reasonable bounds and costs, it could be a useful extension of services now provided.

Added support for the Geological Survey is to be commended. Mapping, both topographic and geologic, should be carried on at a faster rate. The recommendation that a special committee be appointed to prepare an inventory of existing scientific and technical knowledge bearing on exploration is to be commended. I believe the National Science Board is giving serious thought to that recommendation at the moment.

The recommendations with regard to the mining laws will undoubtedly arouse intense opposition. However, the mining community should not dismiss them and might even do well to advocate certain of the changes that are proposed. The abuses that exist are attracting more and more attention and if we do not show more inclination to correct them, others may do so in ways that might be far more dangerous than the proposals made by the Commission, or by the Committee on Natural Resources of the Hoover Commission.

I think the Commission must recognize that when it recommends anything that would extend the leasing laws to the metal mining industry, it's sure to arouse opposition. Mining men have a fundamental distrust of leases, and probably a justified fear that they might be used by bureacrats to impose more and more restrictions on the operation of the leases.

The recommendations on tax policies are excellent and I am sure will be emphatically endorsed by the mining profession.

The Commission's views on foreign investments and international trade are open to many serious objections.

Elaborate provisions for scientific and technical studies carried on by agencies of our Government in foreign lands, for financing ventures too risky even for the Bank of International Settlements or the Export-Import Bank to entertain, and for active government participation in exploration and development of foreign mineral deposits all seem better designed to dissipate American wealth than to attain any significant quantities of metals and minerals at reasonable cost. The control of prices and the negation of free market competition by various devices such as international buffer stocks are likewise unnecessarily complicated. Exploration and development of mineral resources by American capital in foreign lands, balanced international trade, and the securing of the desired supplies of metals and minerals from abroad can surely be accomplished in much simpler ways consistent with our concepts of free enterprise. There, an international monetary system based on gold would be one of the very best tools we could have.

With the recommendation that stockpiling of strategic and critical materials be made a permanent instrument of the national minerals policy, however, I am in complete agreement. Not only does it provide protection against disastrous shortages in time of war, but it also affords one means of increasing our imports without disrupting our domestic economy. The policy of supporting such unbalanced trade through loans, or undisguised gifts, at the expense of the American taxpayer can't go on indefinitely. There is a limit to our resources, if not our stupidity.

National Mineral Policies

Defense Minerals Progress

By HOWARD I. YOUNG
Deputy Administrator
Defense Materials Procurement Agency

THANKS to the wholehearted cooperation of industry, there has been real progress during DMPA's first year of operation.

Here is a brief summary of some of the individual programs that have been worked out to date and what they mean in terms of actual results:

Beryllium—The program on beryllium calls for a 70 percent expansion in production by 1955 through purchase and resale contracts, loans, geological investigation, process development in ore dressing, various hydro-metallurgical studies and related investigations. Studies looking toward beryl concentration on a commercial scale are proceeding apace.

Copper—The copper program calls for an expansion of 25 percent by 1955. Production is being increased at existing plants; high-cost mines are being kept in operation through payment of over-ceiling prices; plants at some mines have been expanded; new properties are being brought into production and old properties are being reopened.

Fluorspar—The fluorspar program calls for a 50 percent increase in production by 1955 through purchase and resale contracts, commitments-to-purchase contracts and tax amortization certificates.

Iron Ore—Production of iron ore will be up approximately 40 percent by 1955, largely through the issuance of tax amortization certificates and help in building access roads and in procurement of machinery and materials.

Manganese—A 30 percent increase by 1955 is expected to result from full utilization of domestic ores amendable to concentration by conventional methods, establishment of Government purchase depots, purchase and resale contracts and increased imports. Steps have been taken to perfect methods for the extraction of manganese from slag and to develop processes for obtaining manganese from low-grade domestic ores.

Mica—Foreign purchase contracts and the establishment of domestic buying stations are expected to increase the country's supplies of block and film mica by 50 percent in 1955.

Molybdenum—An expansion of 130 percent in U. S. production of molybdenum by 1955 is assured through commitment-to-purchase contracts and tax amortization certificates.

Nickel—The supply of nickel will be increased by approximately 35 percent by 1955 through purchase contracts, loans, tax amortization certificates and reactivation of the Government-owned Nicaro plant in Cuba. Plans call for still further expansion after 1955.

Titanium—There are still many problems in fabrication and production, but it is generally conceded that its use in the manufacture of both military equipment and civilian goods will expand greatly. Production already

scheduled for 1955 is several times the present plant capacity.

Tungsten—The tungsten program calls for an expansion of 190 percent by 1955 through the Government domestic purchase program and purchases from abroad.

Zinc—Purchase contracts and tax amortization certificates are expected to result in a 15 percent increase in production by 1955.

DMPA has developed programs to expand the production of 17 different metals and 22 non-metallic minerals. Four of the metals programs and nine of the programs for non-metals already have been completed. In addition, 11 of the metals programs and eight of the non-metals programs are between 70 and 100 percent complete.

The expansion projects approved thus far involve an industry outlay approaching a billion dollars, and there are projects under consideration right now on which industry will spend several hundred millions more.

The dollar value of the materials coming out of the ground in 1955 as a result of these Government-industry programs will be in the neighborhood of $1,100,000,000. This is only new production involving some form of Government assistance. Many of the larger operations, such as copper, will not even be fully under way in 1955.

Perhaps the sharpest criticism that has come our way during the past year was in connection with our announcement that we had been auhorized to purchase 30,000 tons of lead during a period of easing demand and falling prices. Our purpose was not to take up the slack in the market but simply to be prepared to meet requirements later should the supply tighten up again. To date we have bought 26,105 tons. We are holding it for resale to industry, if the need arises. Any of the reserve that is not needed during the next few months will be turned over to the National stockpile. There are, however, no plans at present and there have been no plans to set up temporary reserves of other materials.

Many of you may have been wondering about the future of DMPA. Fankly, I don't know how much further the DMPA program will have to be extended before we can be sure that all the Nation's needs for critical materials will be met.

I am sure that the American mining industry can be counted upon for whatever else is required of it to pull us through this emergency. You have always proved beyond any question that you are both able and willing to do the job.

Future Programs of DMPA

By JESS LARSON
Administrator
Defense Materials Procurement Agency

FIRST of all, I want to thank you of the industry for having had available a fellow like Howard Young to really sparkplug and kick this program along. It is he who is responsible for the rather remarkable achievements of the DMPA over the past year.

DMPA's future can be summed up in one short paragraph. The DMPA's future involves setting about at once to bring it to a close. Our target date is the end of the calendar year of 1953, at which time we hope there will no longer be any need in the government for this emergency organization, and barring an all-out war, we will be able to meet that. Our policies which have been laid down in the formulation of the programs that are now in force, barring any requirement or any need that will be passed on to us from those who ascertain what the requirements are, you will see us starting to fold our tent and silently move away. And that, much as it might surprise some people, pleases us very, very much because we look upon ourselves strictly as an emergency organization.

If I could remind you of just one thing, I would remind you of this: that in all of your deliberations and through no fault of yourselves or the American public generally, this is all too often forgotten. Why did we create DMPA? Why do we have these emergency controls? Why is it necessary for Howard Young to come down and give a part of his life—he and his family certainly deserve to enjoy that life in a manner better than that in which he is permitted to live it now. Why all this?

Simply because a guy named Stalin is loose in the world, and he's been making a lot of progress. And I don't like a lot of these things as an individual any more than you do, but I don't know how we are going to compete with slave labor, with a concept of economic organization that kicks everything out of the window that we would lay down our lives to keep in survival. I don't know how we are going to meet it without making some sacrifices.

PROGRESS IN MECHANIZATION

Session Chairman
HAROLD A. KRUEGER
Manager
St. Louis Smelting & Refining Div.
National Lead Co.

Trends in Mechanized Mining

By SIM S. CLARKE
General Superintendent
Tri-State Mines, Eagle Picher Co.

EQUIPMENT and technique for trackless mining, which covers the three major sub-divisions, breaking, loading and haulage, is fairly well established.

Present efforts are to improve the quality or design of equipment that has shown itself to be satisfactory and embodies the principles which lend themselves to the changes needed to meet varying conditions.

It is very hard to convince manufacturers of the handicaps to which most standard equipment is subjected in the Tri-State field. The gangue is highly abrasive, the bottom is very rough and in some stopes the rock is slabby. Consequently changes are required in material and design of most standard equipment. Much of the equipment we use has been designed and built in our own shops.

Experiments are continually being made on the smaller items that enter into our costs, such as drill steel and bits, plastics, blasting supplies, igniter cord and hot wire lighters, truck tires, etc. A fraction of a cent per ton saved on these items will add up to a substantial sum.

Manganese wearing parts are being substituted where possible on all loading units.

Several jeeps are in use underground by the supervisory and maintenance staffs. These permit better supervision and quicker repairs on breakdowns.

Packaged Material Handling

By W. H. LOVE
Superintendent
Hecla-Atlas Project, Hecla Mining Co.

AT the Star Mine of the Sullivan Mining Co., in the Coeur d'Alene district of Idaho, practically all materials and supplies used in appreciable volume are handled mechanically, chief among these being round and dimensioned mine timber.

Chief contributing factor in development of advanced handling methods at the Star mine is the application of the fork-lift type truck. The first truck put in use was a small machine, of one-ton capacity, for general utility purposes. The equipment now operated at the Star includes four fork trucks, three "grab-jaw" trucks, a rubber-tired crane, a warehouse "run-about," and a straddle truck.

In order to get maximum benefits from rubber-tired equipment a good operating surface is necessary. Surfacing of the mine dump and roads has been completed.

Handling of dimensioned timber, such as lagging, was of first consideration. These were formerly handled piece by piece, by hand. This involved unloading from flat cars to storage area, reloading to timber truck for transport to the Hecla shaft, unloading and reloading on cages at the Hecla shaft, subsequent unloading from cage to timber truck for transport to the Star shaft and winze, thence unloading and reloading on cages for transport to the mine levels for use.

Dimensioned timber is now packaged in uniform bundles at an independent sawmill for rail shipment to the Star dump. Here it is unloaded, three bundles at a time, and placed in designated storage areas.

Round timber, including posts, caps, girts, slabbed stringers and cribbing are cut in the Hecla sawmill at the mine. Stulls in various lengths and diameters are delivered to the mine by flat car, and are unloaded into the appropriate storage areas by a portable high line. From storage skids to sawmill the stulls are moved through use of an ingenious fork-lift mounted on a carriage which travels on a monorail at the base of the skids. In the mill the stulls are cut to desired length, and, if necessary, slabbed or framed. These are bundled into uniform packages and transported in bundles to the storage area.

Each day the mine timber needed for the following day is moved to the Hecla shaft collar. The following morning the bundles of timbers are loaded into the cages by an ingenious truck equipped with a combination squeeze-lift-tilt and rotating fork. This picks up each bundle from its horizontal position and stands it on end on the cage deck. A similar unit, battery-powered, removes the bundles on the main haulage level and loads them on timber trucks for transport into the Star mine, a distance of nearly two miles. The unloading and loading operation is repeated at the two shafts in the Star with a similar truck. As the bundle arrives at the working level, it is swung from cage to timber truck by an air tugger equipped with large tongs. Here final delivery to the working place is made, and the strapping cut for sending into the stope as required.

To partially demonstrate benefits of mechanical handling of these materials, it formerly required a six-man crew one shift to unload and stack a carload of five-ft lagging. This same task is now accomplished by two men in less than an hour, or about one-twenty-fourth of the time previously required.

All warehouse items handled in quantity, such as nails and cement, are palletized for easy and rapid transfer. Powder is handled in pallets of 30 cases each, from truck to magazine, from magazine to mine. Mill chemicals are also palletized. Fork lifts are also used to move slushers, rock drills, fans, pumps, etc.

Assuming that unit costs of labor and supplies remained constant during change-over to mechanical handling methods, cost of handling stulls was cut 30 percent; cost of handling lagging 70 percent.

Close attention given to methods of handling material, equipment and supplies is an effective means of increasing mine plant efficiency and can be applied to nearly any operation, large or small.

S. S. Clarke outlined mechanization trends

Some Practical Aspects of Operating Diesel Powered Equipment in Underground Noncoal Mines

By J. H. EAST, Jr.
Regional Director
Region IV, Bureau of Mines

USE of Diesel equipment underground is still a controversial subject in this country despite its successful utilization for more than 10 years in some American mines. I very definitely favor using Diesel-powered equipment underground, if it is operated in the proper manner and under specified conditions. I am just as strongly opposed to employing diesels underground if they are operated improperly.

Diesel engines have been used in European underground mines, both coal and noncoal, for about 30 years. In this time, not a single recorded fatality has been attributed to toxic gases from diesel engines or equipment. Moreover, no mine fires or explosions have been charged to such equipment. This record proves rather conclusively that diesel powered equipment can be used with comparative safety in underground noncoal mines if the conditions of use are properly controlled.

The following safety factors should be observed:

(1) Arrangements should be made for state authorities

to determine ventilation needs and check on the quality of air both before and after diesel equipment is installed.

(2) State authorities should specifically designate where and under what conditions diesel equipment may be used.

(3) Normal quality air should be maintained in the mine. This means that the oxygen content of the air should be not less than 20 percent, and the carbon dioxide should not exceed one-half of one percent.

(4) Exhaust gas from the diesel engine should be "scrubbed" effectively. The conditioner should be of a type that will not blow out water; its water capacity should be large enough to last at least four hours and preferably for one full shift without saturation; and the water should be drained at least once each shift.

(5) The diesel engine should be maintained in a good operating condition through periodic overhauls as recommended by the manufacturer and by government agencies. It is better to establish the time of overhaul on a basis of the number of hours in operation.

(6) A diesel engine should be properly adjusted and regulated, both for altitude and for use underground. The air: fuel ratio should be maintained at its suitable level, and the adjusting mechanism should be sealed to prevent tampering or unauthorized readjustment.

In my opinion, the use of diesel-powered equipment in underground mining will continue to increase as the industry learns more about its efficiency, mobility, and safety. I believe that ways will be found to utilize diesel power in many more types of equipment than at present. I believe that employe opposition to diesels underground will be reduced when more people have an opportunity to see diesels operating under recommended conditions.

Diesel Locomotives At Idarado

By JOHN S. WISE
General Manager
Idarado Mining Co.

EARLY in 1945, Idarado acquired its first diesel-powered locomotive, a 5-ton, 4-cylinder, 4-cycle engine unit. Reasons for trying such a relative innovation underground included:

(1) An unusually long haulage distance and variable track grades.

(2) Lack of clearance in Treasury Tunnel for trolley equipment.

(3) A knowledge of the successful use of a diesel locomotive in driving the Treasury Tunnel extension.

Although experience with the first locomotive was not completely satisfying, it did point up inherent advantages and led to further experimentation.

Accordingly, an 8-ton, 6-cylinder, 4-cycle engine rated 73 hp at sea level at 1000 rpm was purchased. After handling over 1,000,000 tons of ore for a total of 2,200,000 one-way ton-miles, certain deficiencies were observed. Among these were:

(1) At 10,700 ft the 4-cycle engine loses about 30 percent of its rated horsepower.

(2) Under load the engine tends to slow down, and lose power.

(3) Due to fuel pump factory setting, it is difficult to clean up exhaust smoke.

These and other factors prompted investigation of 2-cycle diesel engines and torque converters. The 2-cycle diesel engine loses only 7 to 10 percent of its rated power at our altitude and when equipped with a scavenger blower will maintain a better air-fuel ratio than the 4-cycle engine. The torque converter allowed more constant engine speed and horsepower, avoided lugging and provided automatic shifting without loss of momentum.

With these points in mind four 8½-ton locomotives were purchased incorporating design features found from past experience to be most enduring and efficient.

Within the past two months we have again entered into the experimental phase with a 4-cylinder, 2-cycle engine. Its performance is very encouraging and augurs well for the future. Several thoughts relative to 2-cycle diesel engines, in the light of current knowledge, should be expressed:

(1) The idea that an air/fuel ratio of 20 to 1 is minimal deserves a few words of explanation. The range of most efficient clean combustion is obtained when the ratio is 30 to 1 or higher. Below a 20 to 1 ratio, combustion efficiency is poor and there is a loss of power. Studies on the 6-cylinder engine with scavenger blower show that air/fuel ratio ranges are practically independent of engine speed. Exhaust smoke is least at ratios varying from 27 to 1 at 2000 rpm to 30 to 1 at 800 rpm.

(2) Performance of a carbureted-mixture engine when operated at constant air/fuel ratio varies directly as the air density. Higher elevations produce too rich a mixture and power loss when sea-level jets are used. In the case of a 2-cycle diesel engine there is a considerable range of altitude where power changes are slight as the air density decreases. The air scavenging process used on the 2-cycle engine tested enables the engine to operate substantially independent of atmospheric conditions.

(3) Our studies have shown that power output characteristics are relatively insensitive to changes throughout a wide range of altitude, but become increasingly touchy as the air/fuel ratio approaches or exceeds the exhaust smoke limit and as the engine approaches peak power. It appears most prudent, therefore, when choosing a diesel unit for underground operation, to select a larger engine than haulage requirements call for.

(4) By exchanging 55 cubic millimeter (cmm) fuel injectors on the 2-cycle diesel engine for the 70 cmm unit injectors, resetting the load limit screw which restricts engine speed to 1200 rpm and advancing the timing on the 55 injectors by using a 70 injector timing pin, we have discovered:

(a) Engine horsepower output has remained substantially the same.

(b) By advance timing the 55 injectors, fuel is injected into the cylinders a little earlier, allows more time for it to burn and improves exhaust conditions.

Idarado has found singular advantages in diesel locomotive operation—namely, wide flexibility, greater safety, excellent tractive effort over difficult grades, simplicity, self-containment, and economy in operating and maintenance costs. The use of diesels underground does require

good ventilation, but most mines could stand to be better ventilated with or without diesels. If a diesel engine is operated at peak efficiency, type and mode of exhaust conditioning assumes a secondary role. It is only logical to exert intelligent effort toward improving engine operation first and exhaust conditioning second. Such a program will provide the mining industry with a remarkably successful tool, one that only a few have attempted to utilize to the full in this country.

Diesel Locomotives Underground in Wyoming

By J. L. FELLOWS
Engineer
Limestone Dept., Great Western Sugar Co.

AT Horse Creek, Wyo., the Great Western Sugar Co. mine produces 200,000 to 250,000 mine-run tons of limestone per year.

Before discussing the haulage equipment, we should first consider the plan of our haulage level. There are two strata of high quality limestone lying about 200 ft apart. These strata strike about N. 20 W. and the dip varies from 65° to 80° with the horizontal. The main adit is about 900 ft long to the nearest vein. In the main adit (8 by 10 ft in cross-section) there is a single 45-lb, 24-in. gauge track. In the two main drifts, which are 8 by 14 ft, there are two tracks, each of 30-lb rail. One is the loading track which runs under the loading chutes. The other is the main line haulage track. The two are interconnected with switches about every 280 ft.

In 1942, the first diesel locomotive was purchased. This was a three-ton unit powered by a 50-hp Buda Lanova engine. In 1942, the average trip was approximately 2700 ft each way and the train consisted of six 5-ton wooden cars. These cars weighed approximately 5400 lbs empty. Twenty-eight trips per eight hours were required. The grade is in favor of the loaded portion of the trip. This locomotive was equipped with exhaust gas conditioner, front and rear headlights, and all other appurtenances.

By 1948, the haulage distance had increased appreciably, and it became necessary to purchase another locomotive. This unit is a 5-ton diesel similar in construction to the 3-ton unit except that the main drive shaft design was revised to include a fluid coupling between the engine and the transmission. When the second diesel was delivered, a locomotive was assigned to each drift.

To facilitate development of the drifts, another five-ton diesel locomotive was purchased in 1950. A fourth unit is on order at the present time. The delivery of the fourth locomotive will provide an extra unit which will take care of servicing and maintenance schedules and provide a spare locomotive in case of emergency.

All locomotives are equipped with "Ruth" exhaust gas conditioners to eliminate aldehydes and noxious fumes from the exhaust. To my knowledge, there have never been any complaints of odors or gases underground. The first conditioners installed were of mild steel, but these had to be replaced periodically because of corrosion. Tests showed the absorption of the exhaust gas components made the water in the conditioner highly acid. The water tested as low as 3.4 pH. Later a screen was installed in the conditioner on which were placed two or three layers of rubble limestone. This reduced acidity to about 6.5 to 7.0 pH. This limestone scrubber has also been effective in helping retain the water in the conditioner. Now, as an added precaution against corrosion, all conditioners are constructed of stainless steel. The exhaust discharge pipe from the conditioner is equipped with a venturi jet diffuser as well.

The ventilation in the haulage drifts and stopes is very good. In Wyoming, 6000 cfm is the minimum air requirement and in tests in the main drifts, the flow of air recorded is 30,000 cfm at a time when the 50,000 cfm forced draft fans are shut down.

Distance and tonnage requirements have made it necessary to purchase additional new cars and increase our trains from six to nine cars. The new cars are steel Granby type, five-ton cars which, when empty, weigh about 6600 lbs each. By 1953, all the wooden cars will have been replaced by these steel cars.

In contrast with the haulage requirements of 1942, when the average trip was about 5400 ft, a production of 168 mine cars per day was required; now the average trip is about 7800 ft and 238 mine cars per day are required. The greatest daily tonnage yet produced is 306 cars or 34 trips in one eight-hour shift using two locomotives. The average load per mine car is 4.2 tons.

Use of Diesel Equipment in a Zinc-Lead Mine

By V. C. ALLEN
Assistant Manager
Tri-State Zinc, Inc.

PROVIDED ample ventilation and maneuvering room, diesel trucks used underground have the same advantages as truck haulage from a limited area on surface.

The Bautsch Mine of Tri-State Zinc, Inc., near Galena, Ill., is well adapted for diesel truck haulage. It is a flat-lying zinc-lead deposit averaging 200 ft wide, 60 ft high, and has a comparatively level floor. Mining is done by the room and pillar method.

Originally opened by two vertical shafts about 300 ft deep and 350 ft apart, a 1700-ft, 10 percent inclined adit was driven for diesel truck haulage between stope and mill crushing plant.

Since the mine is shallow and opened by two vertical shafts and an inclined adit, a 24,000 cfm blower forcing fresh air down No. 2 shaft and four smaller blowers on churn drill holes leading into exploration or dead-end drifts furnishing a total of 30,000-32,000 cfm of air, provide adequate ventilation. The tunnel acts as a mine exhaust. Frequent tests of the air during the past three and a half years have failed to disclose any concentration of CO or oxides of nitrogen, which even closely approached the maximum allowable limits of 100 ppm CO and 25 ppm oxides of nitrogen. Special care and more frequent tests are made in dead-end drifts where air is supplemented by booster fans or small blowers on churn drill holes.

Loading and hauling in daily operation consists of two electric powered boom shovels, one diesel powered loader, one D7 bulldozer and four Koehring Dumptors. There are seldom more than two dumptors with engines running, in the mine, at the same time. Other diesel equipment is used in jumbos and powder loading, but the engines only operate a few minutes at a time with long idle intervals. No scrubbers or other devices are used on any of the equipment, but great care is taken to keep all engines in first-class condition to avoid unnecessary smoke and foul odors. Each truck is serviced and carefully checked daily at the surface shop. Trucks average one general overhaul every two years.

Haul from mine stopes to the mill averages 1.1 miles, includes 2700 ft up 10 percent grade. Each truck makes

16 trips per shift carrying 8.7 dry tons per load. Main haulage roads are well maintained and kept as free as possible of large rocks.

Tons hauled	289,829
Labor	.1153c
Diesel fuel	.0163
*Maintenance and repairs	.0647
Tires	.0273
Total operating cost of trucks	.2236c
Road maintenance	.0104
Total haulage cost before truck depreciation	.2340c

* Includes shop labor chargeable to trucks.

Responsibilities of Manufacturer and Mine Operator

By EWALD KIPP
The Eimco Corp.

IT is a vital factor in the economics of mining that there be a cooperative understanding between the mine operator and the machinery manufacturer. Gone are the days when high grade ore bodies and low labor costs made every mine a profitable operation. The methods and techniques which have become a "must" today were at one time in the past the theories of some mining school professor.

Most of the essential jobs that were necessary in taking the ore out of the ground were practically all done manually; but as these high grade and rich ore bodies faded out of the picture and as the demands of labor unions increased and as the miner had to go deeper for his ore, he became extremely cost-conscious. Mechanization became the answer to this problem. For years the mine operators were frustrated by the fact that manufacturers were unwilling to design machines to meet other than so-called standard conditions.

The jealousies that existed between the personnel of competing mines, the secrecy that surround certain underground methods, together with some forces that have served to deter progress, have gradually disappeared until the machinery salesman has become a sales engineer whose job it is to act as the contact between the mine operator and the manufacturer.

The competent sales engineer has two loyalties. First, the company he represents; and second, the mine operator. It is true that while personal quality such as courtesy, sobriety and affability are essential, the most important quality is dependability.

As for the mine operator, he too has his obligations to the manufacturer. Having a qualified sales engineer calling on him from time to time, the intelligent mine manager finds time, within reasonable limits, of course, for the sales engineer who offers equipment without prejudice to discuss honestly any mechanical features and advantages. The mine operator must make it clear that he is willing to listen but not to purchase; and then, only if what the sales engineer has to offer will solve some problem or increase efficiency. The wise mine operator does not shirk his own responsibilities after the investment has been made in such matters as proper upkeep and maintenance.

There are two teams in the field; the mine operating staff, and the manufacturer and his sales engineers. They must meet on a common ground. Each must appreciate the other's problems, and understand that their problems are mutual; that by reducing costs through efficiency there can be obtained greater tonnages with less manpower. The fair-minded operator will give the manufacturer's equipment a fair chance and the manufacturer an opportunity to build his equipment up to his representations. The sales engineer must never give out operating information unless he is given permission. The ethics of this relationship, if properly observed, can bring substantial progress to all concerned.

SMALL MINES; PUBLIC LANDS

Session Chairman, Small Miners' Panel
BURT B. BREWSTER
Editor & Publisher
Mining & Contracting Review

Moderator, Public Lands Panel
HON. ARTHUR V. WATKINS
U. S. Senator from Utah

Small and Independent Uranium Miners

By H. W. BALSLEY
Moab, Utah

THE problems of the small and independent uranium miners are treated as "skeletons in the closet" and are respectively referred to as price schedule; ore sampling; assaying; leasing; the Oil and Gas Leasing Act; and the Bonus Baby.

Although there has been considerable controversy over the price schedule, the small miners regard the price raises and transportation allowance granted from time to time by the Atomic Energy Commission as helpful. Ore sampling has caused bitter discussions in the past, but radical changes and improvements have bettered the situation between the AEC, the buyers and processors, and the producers. Assaying has also been the cause of friction, doubts and accusations, and all concerned with the uranium industry hope for the day when this can be overcome.

There has been contention in connection with the leasing by AEC of lands containing proven ore bodies. This involves strong feeling on the part of the small producers who compete for the leases.

No one thing in the history of the AEC has had a more devastating effect on the production of uranium ore than has the "ghastly interpretation," allegedly by the Bureau of Land Management, of the Oil and Gas Leasing Act as it affects uranium claims. The Bureau has ruled that any mining claim located over a prior filing of an oil and gas lease is an invalid location from the beginning. This means that regardless of how many thousands of dollars the uranium claimant may have expended upon a claim or claims he filed upon in good faith, he has no priority whatever when the oil and gas lease may be cancelled. Whoever gets there first gets the land.

With regard to bonus payments for uranium production it is felt that if one man's 0.20 percent uranium oxide is worth $7.50 per lb, with the development allowance added, his neighbor's uranium is worth just as much—even if the operator of the latter property has committed the "unpardonable sin" of being an active producer to the extent of 10,000 lbs of U_3O_8 between April 8, 1948, and March 1, 1951. A consistent market for the ore, based upon a fair price right down the line to everyone would

be far superior to the unfair inequities in the present bonus system. In fairness to the officials of the AEC who handle the bonus on the local level, it must be said that the applications for certification on the various properties are handled as expeditiously as possible and the payments on account of the bonus, when once approved, are issued by the Denver office quite promptly.

Manganese—Past and Present

By FRED STAATS
Salt Lake City, Utah

THE Government purchase depots in Montana and Arizona are providing a market for manganese ore. The tonnage authorized by the Government during the five-year period, which started this year, will not be realized unless every shipper really produces. This is a real opportunity for all small owners to actively produce. We have found the Government prices to be right for our operation.

It is possible that the Geneva Steel Co. will operate two furnaces using 1600 tons of manganese a month. If a producer could be free from penalties, the present price of 80 cents f.o.b. shipping point of 20 percent manganese would be good. My suggestion to the U. S. Bureau of Mines and the U. S. Geological Survey is to map and consider extensions or ore bodies in known manganese areas.

The Smelter and the Small Miner

By E. McL. TITTMANN
General Manager
Western Department
American Smelting & Refining Co.

IN the area west of the Mississippi River there are twelve copper plants, nine lead smelters, and eleven plants treating zinc concentrates. Some 1700 producing mines lie in this area, of which few are sufficient in size to support a smelter or reduction plant. Consequently, most of these mines depend upon custom plants to market their products. The independent operators and the smelters, therefore, have a strong community of interest. What is good for one must be good for the other because neither can exist alone.

There are now insufficient ores and concentrates produced in the United States to keep these plants busy. The smelter must have a base tonnage that will support continuous operations. In the case of lead ores, domestic production has declined below this point and imported ores must be used to assure continued operation of some of these plants.

The small metal producer must have a means of getting a quick cash return. He has neither the resources to carry the burden of smelting, transporting and refining his product nor the opportunity to find a buyer. He, therefore, sells his concentrates or ores outright at current metal quotations and the smelters assume the risks of marketing the resultant metal. However, this practice of maintaining an offer to buy at market prices poses a difficult problem under present conditions, if demand shrivels and stocks of metal begin to accumulate. No smelter has the resources to underwrite metal prices for an indefinite period. While orderly price changes are desirable and cannot be avoided in a free market, it is to be hoped that the needless fluctuations that have followed Government controls can be eliminated and thereby afford the small producer a more dependable market.

Quite naturally the smelters are interested in the success of the small operators. During the early stages of development small miners and leasers quite often cannot afford the expense of geologic mapping, assaying and the obtaining of other information necessary for development of the property. Smelters for many years have assisted by providing competent engineers and geologists to map the workings, check sample the ore showings and advise on development. Likewise, the smelters help in negotiating more favorable ore freight rates and, in some cases, provide mining equipment.

"Summing Up"

By ROBERT S. PALMER
Executive Director
Colorado Mining Association

MUCH has been accomplished by both Government and industry in reopening and revitalizing old mining properties. But, we have been deterred in our efforts to find new deposits and encourage the entrepreneurs, especially the little fellow, in the field of mining activity. The huge programs sponsored by both industry and Government of exploring and developing mineral resources abroad involve the simple procedure of advancing American taxpayers' funds on long-term loans with low interest rates, or outright gifts. The word "subsidy" with reference to foreign production is never used in higher circles.

The importations of raw materials have affected the domestic market and, in some instances, forced the closing of marginal or small mines. The mere fact that the small miner loses his shirt as a result of the international program or the workings of the so-called free market is of little significance when one considers the over-all economy of our great nation. But when one resorts to a study of the statistical records of the discontinuation of the small mines and visits those areas in which small mining was formerly a major occupation, one sees first-hand the results of policies which have continued the slaughter of the small mines of America.

A flood may destroy an industrial community, in which case much is said about the catastrophe in the press and on the radio; but when 73 percent of the producing metal mines in the eleven western States are closed down, little mention is made in the headlines. It is the grave responsibility of the leaders of our industry to recommend some measures which will result in the continuation of all worth while programs designed to encourage the development of new mineral enterprise within our boundaries.

The sounder course for America to chart is one which involves a healthy expansion of our domestic mining industry, regardless of temporary costs, until the day is proclaimed when America will be able to protect itself from any possible invasion, regardless of its duration and notwithstanding the possible curtailment of imports.

The cause of the small miner involves the future welfare of America. Lest we forget, all big mines were once small mines, and practically all small mines were once but a prospector's dream.

Public Lands Panel

Prominent legislators and industry representatives talk over National Public Lands Policies

By HON. ARTHUR V. WATKINS
U. S. Senator from Utah

IMMEDIATELY after Secretary Ickes and many new employes of the Department of Interior came to power one of their first proposals was to junk the mining laws and substitute a leasing system. Later the Bureau of Land Management circulated pamphlets entitled "Revision of the United States Mining Laws" giving reasons why revision of the laws is, in the belief of the Bureau, desirable and even essential.

Recently the Paley Report contains recommendations which bear all the earmarks of proposals started under Secretary Ickes' regime. It is difficult to properly consider the proposed changes without keeping in mind the difference in the philosophy of the framers of the mining law and that of Secretary Ickes. The mining laws were designed to encourage individual development and ownership of our mineral resources. Mineral lands were offered to those who would spend the time and money in developing them just as agricultural lands were offered to the homesteaders. Our present Administration has a different philosophy. It is premised on the Government's retaining ownership of public lands, and permitting multiple use of the surface by individual citizens upon a royalty and rental basis.

Such proposed changes in the underlying philosophy of our present mining policy would seriously affect tax income for public-land states in all future mining developments. Just consider that Utah, Montana, Arizona and other western states are now receiving a large tax income from large mining operations, which they probably would not receive if these operations were on a lease basis.

By HON. WESLEY A. D'EWART
Member of Congress from Montana

OVER the years the House Sub-committee on Mines and Mining has held many hearings throughout the country toward the end of encouraging the production and beneficiation of ores and minerals, strategically and critically important in the war effort. In these hearings there was no major criticisms made to the Committee of the Mining Laws of 1872 or the Mineral Leasing Law of 1920. No one charged that these laws were unduly restrictive or that they hindered the development of our mineral resources. The demand for changes in these two basic acts has not come from the mining industry itself, but from other sources. These demands should be examined with great care—otherwise, development and production of minerals will be hindered or stopped to the great harm of the nation. It is admitted that abuses in the use of our mining laws have crept in over the years, but any proposed changes should be examined very closely before they are written into law.

Robert M. Searls, a member of this panel, has said: "The Federal Mining Laws enacted in 1872 were designed to encourage individual exploration, ownership and development of public mineral lands without interference from the Federal Government."

No one will deny that statement. The right to prospect, to establish a claim, and then to develop its mineral wealth has been the incentive that has made possible the search for the mineral resources in our hills and stream beds and made them available to the untold benefit of mankind. We should proceed with great caution in altering or discarding a law that has provided such great opportunity and wealth to this country.

Many of the abuses that have crept in under our present mining laws are violations of the law and a more rigid enforcement of the letter and intent of the acts is all the correction that is needed. If fraudulent locations are made, the Government has the right to refuse patent to these locations, or to attack them in court. That is the American way.

There have been those before our Committee who have suggested substituting a Leasing System for our present mining laws. This would be contrary to the fundamental philosophy of our Government that is based on the underlying economic belief in private enterprise and individual initiative. Under such a system a prospector would be compelled to take the Federal Government in as a partner, who would share in the management and profits, if any, but not in the loss if the venture proved a failure. A leasing system would destroy—not encourage—the search for new mineral wealth which we must have if our country is to prosper.

An addition which might well be made to our Federal mining laws would encourage new methods of exploration for ore bodies. Geophysical search and other new techniques designed to uncover sub-surface or concealed deposits require a large investment and are generally applicable to a considerable acreage. A new section added to our present mining law which would encourage these modern methods of prospecting until they could qualify under present statutes by making a location, would appear to be in the public interest.

In conclusion, studies should be made of ways and means to correct present fraudulent uses of our mining laws.

However, in correcting these abuses, better take care not to destroy the system under which we have established an industry which has added immeasurably to the growth, the well-being, and the security of our country.

By HON. WAYNE ASPINWALL
Member of Congress
from Colorado

WE have two methods of acquiring rights to minerals on public lands . . . the first being location and the other leasing. The location procedure is the transfer of absolute rights from the Government to the individual, while the leasing procedure is the transfer of some rights by the Government yet retaining to the Government the "landlord" rights to the area and to the mineral in question.

The system of appropriation by claims worked very well in the early days of development, when most ore bodies were discovered from surface outcroppings or from washings into a stream. Unfortunately, this system presented the opportunity to make nominal "discovery" and preempt valuable areas of the public domain for use other than the production of ore.

At present there is a very real and crucial problem brought about by the conflict of present laws as they affect the vital production of uranium ore on the Colorado Plateau. This grows out of the conflict between the location system, which the prospector is trying to use in the development of uranium ore, and the provisions of the Mineral Leasing Law which reserves to the Government all oil, gas and other minerals specified in the Leasing Act of 1920. In this situation, previous leases for oil and gas have automatically "withdrawn" the area for location or development of other minerals. Hence the uranium prospector can go ahead and locate and even develop his mine, yet his claim cannot be recognized as valid, for the uranium ore, in any event, is reserved to the Government. Under present rules and regulations, no bonus can be paid by the Atomic Energy Commission for ore output from lands where the uranium claim is "clouded" by the previous oil and gas lease.

As a possible solution our mineral laws might simply state that "The people collectively (as the Government) hereby reserve and hold, *in trust* the mineral wealth on public lands. This trust material shall be available for development by private individuals on their own initiative, subject to the absolute minimum of interference by the agencies of the Government."

This possible procedure is oversimplified, but it is from simple stones that foundations are made. We must be just as practical today in meeting today's problems as were our hardy forebears in meeting theirs without the agency of law sitting in exalted judgment. Law, after all, should be predicated upon the common sense of the community and should be a means of enabling the individual to utilize his own talents without unreasonable interference by, or with, others.

On these assumptions then, it would appear that our laws should be so changed as to allow for an alternative to location for the acquisition of metalliferous ores. This would, of necessity, include some provision, where surface indications were lacking, for a "hunting license" of rather short duration during which the individual could make adequate search prior to filing.

It would seem that if the developing were done under a leasing formula, any royalty payment required of the individual making the discovery should be less than that required of lessees on areas blocked out either by the Government or by an individual. It has been suggested that competitive leasing principles would apply to known geologic areas as it now does in oil and gas. No new provision should do away with the right to acquire a patent to a given mineral claim. In any event, no change should operate to the disadvantage of the small independent operator.

By A. O. BARTELL
Raw Materials Survey
Portland, Oreg.

THE plethora of bureaucracy-inspired articles which are appearing in the newspapers and national magazines decrying the "timber thefts" . . . the "land grabs permissible under the archaic mining laws dating back to 1872" are obviously designed to antagonize the lumbermen, the stockmen, the farmers, the conservationists, and the sportsmen into joining the Bureau of Land Management's clamor for sweeping changes in the mining laws.

The Raw Materials Survey, dedicated to the industrial growth of the Lower Columbia River Basin, has investigated the alleged "land grabs" and concludes that the Bureau of Land Management campaign is promoting discord among the natural resource based industries in order to remove mineral lands development from the jurisdiction of the courts and into the Bureau's "permittee" and "multiple use" system.

We found mining claim "land grabs" had been greatly overplayed, misleadingly presented, and that the actual "grabs" were well within the legal power of the Bureau of Land Management to prosecute.

The lumber industry in the Pacific Northwest has been a particular target of the Bureau's pressure tactics. The Forest Service has the lumber operators convinced that they are at the mercy of mining claimants and to make this threat real, the new contract issued by the Forest Service to the successful bidder for a block of timber on public land gives him no rebate for loss of timber due to mining claim filings within the tract unknown at the time of bidding, nor for loss on claims that are staked after the contract has been let. The Forest Service will charge for the timber whether the operator gets it or not.

The Western Pine Association, whose members produce over 70 percent of the lumber in the 12-state western pine region, recently sent out a questionnaire to some 400 operators asking information on conflicts with mining claimholders. The large majority of replies showed that there had been no conflict, and some of the lumber operators answering the questionnaire actually took the trouble to write that they had experienced cases of cooperation with claimholders.

Any proposed changes in the mining laws should be very carefully considered. The people of Oregon have already had a convincing display of what happens to their basic mining laws when even a small crack is left in the door. During the seven-year period prior to April 8, 1948, the Oregon and California railroad grant lands comprising 2,500,000 acres, nearly half of southwestern

Oregon, were *closed* to mining development—not by legislation—but by edict of the Department of Interior. It was only after a bitterly waged seven-year battle on the part of the mining fraternity and organizations of individuals interested in Oregon's industrial development, that the Oregon delegation was able to force a bill through Congress setting aside the Interior Department ruling and reopening the land to mineral development.

The Interior Department has the apparent goal of complete control of all public lands under its jurisdiction. The present mining laws have been interpreted and delineated by court cases ever since 1872, but the moment some change is made in the law that is not backed by ample court precedent, we have been shown that we open ourselves to law by administrative interpretation which is not referrable to the courts.

R. B. HOLBROOK
Attorney
Salt Lake City

THE following remarks are directed to four of the seven changes in the mining laws proposed by the Paley Report.

The first change proposes that the annual labor required on unpatented claims be increased from $100 to $250. The Bureau of Land Management has suggested a greater increase than that. The second, that the improvements required for granting a patent should be increased from $500 to $1250. These proposed increased amounts will not result in the performance of any more work than the present requirements would have produced several years ago, but to increase these expenditure requirements by two and one-half times would work a hardship on the prospector and small mine operator.

The third proposal is that all unpatented mining claims, accurately described, should be recorded in the Department of the Interior; that failure to record an existing claim within three years of enactment of the amendment should constitute abandonment, and that new claims should be deemed invalid until so recorded. This is desirable if it can be done without interfering with the location of mining claims, but in my opinion, it cannot be accomplished without materially interfering with such locations and without changing the whole fabric of our mining laws. An adequate description would probably require a survey, accurately fixing the location of the claim with respect to public lands surveys. Generally, locators have neither the equipment nor the training to make such a survey themselves, and it may cost a substantial amount to employ an engineer to make it.

The fourth proposed change would limit future claims and patents to mineral deposits and only such surface rights as are needed for mining purposes. The proposal would require an army of Federal Administrators to regulate the uses, as between miners, loggers, grazers of live stock, and others.

None of these changes would facilitate the development of our mineral resources.

ROBERT M. SEARLS
Attorney
San Francisco, Calif.

IF the alternative of the leasing system for metal mines were carried into effect, the Department of Interior would probably exercise very wide powers, as in the case of oil leases, over the operation of mines on the public lands.

As to the effect of the oil leases on the uranium miners on the Colorado-Utah Plateau, it seems that the wide powers of the Secretary of the Interior under the oil leasing system would be ample authority for him to make regulations permitting the removal of uranium ores. Thus the uranium miner could be given by regulation a priority which would entitle him to remove the ores he seeks.

The Paley Report suggests that in addition to existing authority to invalidate mining claims through court procedure on the ground that there has been no discovery, the Department of Interior should be authorized to invalidate claims on the showing that deposits are insufficient to justify further development, or that assessment requirements have not been met. Transfer of power to make judicial determinations to the Department would work a grave injustice. A miner locator is entitled to his day in court as to the sufficiency of his action and the title before he is deprived of what may be valuable property rights.

Take as an example, a mercury mine which can be profitably worked when the price of mercury is $160 to $212 a flask. When the price of mercury drops to $70 a flask, the mines cannot be operated at a profit. Would the Secretary of Interior then be entitled to come in and say these mines don't contain metals justifying development?

Take the final suggestion that claims not patented within 10 years should be deemed abandoned. I have waited as much as seven years for the issuance of a patent. The delays have been in the Land Office. They claim they haven't had sufficient personnel. If the Bureau of Land Management would spend some of the money Congress appropriates for personnel, instead of publicity and the dissemination of trouble-making information, I have a feeling that we might get our patents more quickly.

OPEN PIT MINING

Session Chairman
WILLIAM H. GOODRICH
General Manager
Chino Mines Div., Kennecott Copper Corp.

Blast Hole Rotary Drilling in Open-Pit Mining

By GEORGE R. PUTNAM
Vice-President
Utah Construction Co.

IN March, 1951, our drilling concept changed when we received and tried out our first oil-well type rotary drill for blast-hole drilling. There was nothing new about rotary drilling except its application to the blast-hole field and the use of air to expel the cuttings and cool the bits. Prior to delivery of the new machine at our Cedar City, Utah, open-pit iron mining and stripping operation, we were using wagon drills. Some use had been made of churn drills, but due to water problems in this semi-arid area, and other problems peculiar to this operation, results were poor.

To provide muck for each six cu yd shovel, six to ten wagon drills were required. One rotary drill is sufficient to keep ahead of each six cu yd shovel. Therefore the replacement eliminated not only the wagon drills but considerable payroll, air, pipe lines, steel, nipping costs, servicing, etc.

Experience with the original rotary drill shows 4,000,000 cu yd overburden drilled. This material consists of limestone, sandstone, caliche and quartzite. Over-all drilling speed has been 41.2 fph, including moves. Two additional machines were placed in operation in the Cedar City area and one in the Salt Lake City area. The latter, drilling in porphyry and quartzite, has produced 59,227 lin ft of hole in 1975 hrs, averaging 30 lin fph. Bit life on the original machine at Cedar City averaged 1800 ft per bit. One bit used in soft limestone and caliche showed 6000 ft before failure.

Since most bit failures occur in the bearings and the larger bit with correspondingly larger bearings outwears the smaller size, we have standardized on 7⅞ in. Hughes Tricone bits. Fragmentation in the hole is the result of cutting and crushing action, which calls for a different type bit for soft, medium, and hard rock. The difference in bit types is in the tooth design, small teeth for hard rock and large teeth for soft rock.

At one of our mines a quartz formation was encountered where bits failed at around 100 ft of use and drilling speed was cut to 13.5 fph. To overcome this, a Hughes tungsten carbide insert bit, Type R1, in 6¾ in. size, normally used in oil well drilling, was tried. Failure with this bit occurred at 1108 ft when the shoulder wore away from the bearings and exposed them. Average drilling speed was 32 fph, excluding moves.

We have not yet found the limitation of this equipment. We are told that wet ground can be drilled, but changes in the machine are necessary so that water rather than air is used to return cuttings, and bits of the oil well type are substituted for air jet bits.

Our chief concern was the limitation of the rotary type drill and tricone bit. We were hesitant in depending on this equipment when very hard rock might be encountered, fearing that progress would be slow and bit cost out of line. However, upon completion of our experiment with the tungsten carbide insert bit, many of our doubts were quieted so that we now feel confident we can drill most types of rock encountered in open-pit mining, or on any work worthy of the investment and adaptable to production drilling.

Truck Haulage and Maintenance in Copper Mines of the Southwest and Northern Mexico

By H. C. WEED
Assistant General Manager
Inspiration Consolidated Copper Co.

TEN copper mines in the Southwest and northern Mexico contributed data for this paper. In this area 173 trucks move an average of 262,500 tons of material each day, or an average of 1517 tons per truck per 24-hr work day. Assuming 307 work days per year, over 80,500,000 tons will be moved by trucks at these ten mines in 1952.

Pay load of the trucks in use varies from a low of 15 tons for a few of the older trucks to 45 tons for two Tournarockers which are used as trucks in one mine. The majority carry a pay load of from 22 to 35 tons with all of the newer trucks carrying 30 or more tons. All trucks are rear dump and all have power steering.

Torque converters are used in 76, or approximately one-third, of the trucks. The consensus of opinion in the Southwest seems to be that, although still in the development stage with much more to be learned about their performance, the Torque converter is well worth while. Shock loads are absorbed in the converter and repairs are reduced. In some instances the installation of a Torque converter has allowed the pay load to be increased, particularly on grade hauls.

All of the operations consider driver training a matter of considerable importance. The training varies from breaking in with a qualified driver as instructor to breaking in a truck foreman as an instructor with further checkup by the same foreman. This latter method is said to have reduced maintenance costs quite noticeably.

Road maintenance is recognized as an exceedingly important feature and each company has one or more road graders and sprinkling trucks in operation. The sprinkler trucks are in constant use except during brief rainy spells. Keeping down dust is of utmost importance both from a safety and engine maintenance standpoint.

The prime importance of preventative maintenance on trucks and engines is fully recognized. All companies operate with a scheduled inspection and greasing of the trucks including regular oil changes and air cleaner servicing on the engine. In addition, regular engine checkups and tuneups are scheduled. All companies do the minor repair work on their engines and six do their own major overhauls. The other four send their engines to an outside shop for major overhauls.

Tire life as reported in miles ranges from a low of 10,000 to a high of 22,500. It is interesting to note the highest averages are reported by companies who use dual rear axles exclusively and the lowest from those using single rear axles exclusively. On the basis of an estimate, it would appear that the total tire cost per mile does not vary greatly between the two types of trucks. Recapping of tires is standard practice at eight companies, the percentage of tires recapped ranging from 5 per cent to 80 per cent, and averaging 32 per cent.

Light trucks are used by each company to properly supervise and service the operations. Seven of the ten companies have the supervisors' trucks and service trucks equipped with radio to speed up repairs and control operations.

Truck Maintenance—Minnesota Iron Ranges

By CHAS. A. LINDBERG
Supervisor of Truck Maintenance
Oliver Iron Mining Division,
U. S. Steel Co.

TRUCKING in Minnesota in 1951 required over 1400 truck units moving 77.5 percent of the 231,000,000 tons of iron ore and stripping for the year.

Trends in truck sizes are to 35-ton units with about 400 hp in one or two diesel engines and in straight end dump trucks with tandem rear axles. A considerable percentage of these large units are equipped with torque converters. Three experimental 50-ton trucks, two with 550 hp butane engines and one with 600 hp diesel motors are now under test.

Rapid changes in sizes, designs and powers make a standardized preventive maintenance schedule difficult to establish. To get "productive maintenance," i. e., maximum availability from new equipment that is not service tested and proved, requires close daily preventive maintenance, automatic safeguards that work and close observation and reporting by the driver.

Practically all operators make minor and major overhauls on all truck equipment, including engines. Larger operators provide special facilities and repair space for engines, transmissions, differentials and rear axles, and fuel pump repairs. An increasing number provide engine dynamometers for run-in, fuel adjustment and horsepower check. These devices pay large dividends.

It is general practice to make minor and running repairs at garages in the pits with major overhauls and specialty work done at central or headquarters garages.

Climatic conditions on the Iron Range call for special equipment on the truck and seasonal problems in changes of the different oils used and in the engine coolant. Heat control and the related cab temperature condition and driver comfort are an important winter maintenance problem. The use of heated bodies has introduced new problems in body design and upkeep.

Cost and size of initial installation of electrical equipment and excessive maintenance and outage from this cause have been materially reduced by going to air starters and a relatively small and simple six or 12-volt electrical system for lights and accessories. Truck wiring still causes too much trouble.

Tire performance has gone down with the increase in truck sizes, primarily due to the over-rating of tire capacities by the truck manufacturers. The majority of the operators send out their tire repairs and recapping to tire agencies, but most companies do their own tube repair work and tire mounting. One company is completely equipped to do its own tire work and finds it successful and economical.

A recent and very important addition to the maintenance picture on the Iron Range has been the formation of a Range Mechanical Committee which meets monthly to discuss maintenance problems, exchange maintenance ideas, report on and tabulate the record of failures of designated components on all makes and models of trucks and meet with the manufacturers' representatives to discuss truck weaknesses. Membership is open to maintenance men from all companies using automotive equipment and the number from each company is in proportion to the number of units of such equipment. Dinner meetings are held, alternating between two principal Range towns, and the minutes and the findings are reported to the management of each participating company.

The Use of Heavy Duty Trucks in Mining and Open-Pit Operations

By JOSEPH WELLS
President
Wells Cargo

PROBABLY the most essential point in the operation of earthmoving trucks is the engineering and selection of the proper type for each particular job. Off-highway trucks are used by Wells Cargo for hauling distances of three to 15 miles. The truck is more adaptable to higher speeds because of its general design, longer wheelbase, springs, better gear combinations in the transmission, and more available axle ratios. Braking ability is very essential in fast, longer-haul operations, and better brakes are available on trucks because braking is done on five axles.

For short hauls (from three to five miles) the earthmover type of equipment is utilized. Here tare weight of the equipment is not too great a consideration and the earthmover is generally considered more maneuverable, as they usually have a shorter-wheel base.

Torque converters and torquomatic transmissions are being considered more and more as an actual necessity in this type of equipment because it almost entirely eliminates gear shifting. Hydrotarders are essential where heavy grades exist. They are generally much more important on earthmovers, as this equipment has inadequate braking power. Trucks generally do not need hydrotarders unless operating over grades of 10 percent or more, or on long favorable grades.

Wells Cargo's operations cover some five states and approximately 400 pieces of equipment. They use the unitized repair program. Each outlying division is equipped with a complete set of overhauled part units, consisting of engines, transmissions, rear-ends, and all component engine parts. This eliminates the necessity of having highly skilled men on outlying jobs. Units are replaced when necessary and are overhauled in the main shops by skilled mechanics.

Engines are overhauled and tested with a dynamometer under full horsepower loads for as high as three days. By doing this, the engines are ready to go to work when installed in any piece of equipment. On every job there is a preventative maintenance program based on the mileage or hours of equipment operation. Schooling and training of drivers is essential in arriving at lower maintenance costs. Lubrication men are considered just as essential as mechanics and are usually paid mechanics' wages.

Preventative maintenance has paid Wells Cargo. Breakdowns and layups are almost completely eliminated and the system is far superior to the breakdown maintenance program which is being practiced by the greater part of the mining industry. It is the feeling of the company that preventative maintenance is absolutely essential. It is the know-how that saves you money and keeps your equipment rolling.

Hydraulic Transportation of Solids

By I. S. TILLOTSON
Mining Superintendent
International Minerals & Chemical Corp.

THIS paper has certain technical aspects, but it is primarily intended to describe practical equipment and the application thereof to the transportation of phosphate matrix from the mines to the washing plant of the International Minerals and Chemical Corp.'s several mines. The company has two types of deposits to be handled. These are referred to in this paper as the Noralyn-Peace Valley type of matrix and the Achan type matrix. The Noralyn-Peace Valley type matrix is principally composed of concentrate feed and does not contain any appreciable amount of plus 14 fraction. The Achan type matrix is principally pebble phosphate with a small percentage of minus 16 fraction.

The mining operation starts with the dragline which strips overburden, casting the spoil into the mined-out pit, and digs the ore, or matrix, which is dumped into a well where it is sluiced by hydraulic monitors to a sump in which the pump suction is installed. Hydraulic monitors are used to sluice the matrix with clear water supplied by two-stage centrifugal pumps at adequate pressure.

Solids handling pumps are powered by an electric motor drive installed in a pump car.

The matrix and hydraulic water are mixed to form a pulp and pipeline size is carefully chosen to fit the characteristics of this pulp as they affect its "pumpability."

Hydraulic conveyance of solids is a unique science in which very little formal research has been accomplished. Criteria other than rule-of-thumb methods for design and application of pumping equipment are almost completely lacking. It is probably true that the Florida phosphate fields have utilized this method of transportation of ores to preparation plants more than any other mining activity in the world. The United States produces about 30 percent of the world's phosphate and the Florida fields produce 75 percent of this total.

International Minerals and Chemical Corp. is the largest producer in the phosphate fields of Florida, has long been intensely interested in the development of better methods of transporting phosphate pulp in the most advantageous and economical manner. Integration of the company's experience with that of the manufacturers of pumps has been bent toward the development of the best equipment possible.

Wound rotor induction motors are employed to drive the solids handling pumps to obtain speed control. These motors are arranged in conjunction with the pumps and the entire unit, including control grids and auxiliary power equipment, are installed in a pump car. The cars are unique in construction, especially in view of the weight of equipment involved.

From the pump suction, step by step along the line from 5000 to 11,000 ft to the preparation plant, each piece of equipment is carefully designed from the standpoint of engineering and performance.

MANPOWER—LABOR RELATIONS

Session Chairman

J. B. HAFFNER

General Manager

Bunker Hill & Sullivan Mining & Concentrating Co.

Eliminating Subversives From Government

By HON. PAT McCARRAN

U. S. Senator from Nevada

FOR the first time in our history, we, as a nation, are faced with the threat of a direct attack upon our homeland. Our greatest potential enemy is Communism.

Just by existing, we are a deadly danger to the Communist program of world domination. That is why no measures of appeasement can change the Communist objective of eliminating us. An attack upon us, from without, is a possibility. If it comes, we shall meet it and defeat it, so long as we remain strong within. But we are subjected today to an attack from within which could bring about the domination of the nation by Communism without the firing of a shot in our defense.

With respect to national peril from without, we must rely primarily upon our defense program for protection. It can be truthfully said that the backbone of that program is the American mining industry. Upon its stability rests the safety of our nation.

This poses a challenge to the mining industry of this nation. All of your efforts to help build the strength of this nation both industrially and militarily will be hampered and sabotaged by the Communist world conspiracy acting in this country and in your industry through such agents or dupes as it can turn to its purposes.

It is imperative, therefore, that you should be fully cognizant of the fact that the Communist threat from within our own borders is real and active. If you, the leaders of this industry, fully comprehend and appreciate this one salient fact, your industry can be safe. If you do not or will not realize it, God help you, the mining industry, and the United States of America.

There are millions of loyal Americans, who have no appreciation of the extent or nature of the Communist menace within our borders. This is not surmise; it is not guesswork nor wild and irresponsible statement. I know it from sworn testimony, under oath, given before the Senate Internal Security Subcommittee of which I have the honor to be Chairman.

These are simple facts. The leaders of the Communist world conspiracy recognized twenty-five or more years ago the key position of China in Asia. At the same time, they recognized that the United States was potentially an insurmountable obstacle to the attainment of Communist objectives in China and in Asia.

The time came when the fate of China, and the ultimate fate of all Asia, hung in the balance, where it could be tipped by the action or inaction of the United States; when strong support by us of the Chinese Nationalist Government would mean defeat for the Chinese Communists and a severe setback, if not eventual frustration, for all the Communist aims in Asia.

The time came when a man named Owen Lattimore laid on the desk of the President of the United States, memoranda favoring reversal of the policy which we were then following, that of supporting the Chinese Nationalist Government and opposing the Chinese Communists. The time came when this course of action became the official policy of the United States.

When Chiang Kai-Shek, denied the aid he had a right to expect from us, was forced off the mainland of China by Communist armies, we lost face throughout Asia. The world Communist conspiracy gained an open door to the rest of Asia. The stage was set for Korea.

The evidence of all this is available in the printed record of our hearings on the Institute of Pacific Relations.

I shall give you, very briefly, certain facts which I know to be true.

The Communist Party may have gone underground, but it is still extremely active.

There are, in this country today, Americans of good education and great ability who are doing the bidding of the Communists.

There are American citizens who are not Communists and who are not disloyal, but who are following courses of action, espousing causes, and advancing propaganda favorable to the purposes of the Communist world conspiracy; some of them, perhaps, without even recognizing that this is so.

There are non-Communist organizations in America today which seek objectives that would soften America's resistance and help to pave the way for Communist domination of America.

There is an active Communist program seeking to infiltrate and control media of public expression and the dissemination of public information.

There is an active Communist program seeking to infiltrate and control key labor organizations.

These are some of the dangers we must face. To face them, we must first awaken to the realization that they do exist.

It is this realization to which I would bring you. If America will awaken to it, we can save this nation and go forward to lead the world to a vantage point in history from which we can look back upon the threat of Communism and say: "That was; it is no more; mankind is free."

Recent Wage Contract Negotiations

By PAUL H. HUNT
Vice-President and General Manager
Park Utah Consolidated Mines Co.

THIS is a brief review of four labor dispute cases which went to WSB. The companies involved were the Garfield Smelter of the A. S. & R., the U. S. Smelting Refining and Mining Company, the Combined Metals Reduction Company, and the New Park Mining Company. The union in all four cases was the United Steel Workers of America.

The USW are rather new in the non-ferrous metal mining labor field. In Utah they represent perhaps, half of the non-ferrous industry workers, and in the United States only, five or six percent. It is their, however, intention to control the entire mining industry of this country, ferrous as well as non-ferrous.

The steel workers presented a new way of injecting an old idea into the negotiations. They wanted to translate the methods that had been used in the steel plants of classifying all workers. Thus, in the non-ferrous industry there were to be 16 classes, and each worker would be weighted according to the requirements of his job with wages for each of the 16 classes on a uniform rising grade. Increased payment between job classes, "the increment," would be expressed in cents per hour increase.

In these four cases two of the companies failed to reach conclusions both on classification and on the increment to be used. The other two companies reached agreements on classification but failed to agree upon the increment.

The first of these cases heard was that of the Garfield Smelter. The WSB decided that an 8 cents per hr increase of pay was warranted because of increased costs of living.

Then in turning to the classification of the men, they determined that the increment of pay between the job class No. 1—the lowest classification—and job class No. 16 should be 26 cents a shift. The net result was some $3.90 difference in pay between job class No. 1 and job class No. 16.

The other three cases—the U. S. Smelting, the Combined Metals, and the New Park—were finally settled by the public and the labor members of the panel invoking what is known as the tandem relationship.

They did try to invoke the same tandem relationship in deciding upon the increment for the three companies as had been used in the Garfield Smelter case. In the case of the U. S. Smelting Refining and Mining Co., they did have the same 3¼ cents an hour increment between job classes. With the Combined Metals, and New Park they modified it to 2¾ cents an hour increment. However, the net result was that this gave the USW a considerable lead over those who, months before, had reached agreements by usual negotiations.

The decision of the Board provided for an increase of about 15 percent in wages, and that, due to overtime and fringe payments, would be increased to about 18 percent. So, the net result was simply this: The companies enjoyed a metal price this year about five percent greater than in the prior year, but the decision of the Board increased their costs of labor about 18 percent; that is, their labor costs were increased about 3½ percent for each one percent rise in metals prices.

While WSB explicitly said that this decision covered only the year ending July 1, 1952, their decision was taken by all unions as a precedent established by the Government of the United States. So, every union since July 1, 1952, is out to get at least the decision of the WSB, and more, if possible.

Wage costs have increased following this WSB decision between 30 and 33 percent. It throws the entire burden on the producer. The Wage Stabilization Board's errors lay in ignoring entirely the contracts and exceeding the rates reached by negotiations, destroying the historical tandem relationship and disregarding ability to pay these increased wages.

A Sound Labor Relations Program

By HON. WINGATE H. LUCAS
Member of Congress from Texas

I HAVE the pleasure of representing what I think and hope is the proper public view within the membership of the House of Representatives in regard to labor relations, and I wish I could tell you exactly what the 83d Congress will do with the Taft-Hartley Act. Yet, I believe that enough information is available to make possible some deductions.

In view of the attitudes of the two Presidential candidates, it is virtually certain that labor legislation of some sort will constitute a major struggle during the first session and probably the 2d session of the 83d Congress.

The time has come for American management in all areas of business activity and the American people to decide on a long-range objective. And I submit to you for your earnest consideration that the objective should be the reduction of the role of the Federal Government in labor-management relations.

What we must do and in the near future is to return control of collective bargaining to the employes themselves. Only thus will we be able to establish equality of bargaining power between labor and management. The right of the employe to organize and bargain collectively must remain inviolate. But this does not mean that the employes of competing employers should be represented by a common bargaining agent.

Here is how my bill on this subject would establish an equality of economic power between labor and management: To begin with, my amendment to the Labor-Management Relations Act would prohibit both the monopolistic strike and the monopolistic lock-out.

This prohibition is enforced in precisely the same manner as are other unfair labor practices now listed in the Taft-Hartley Act. An NLRB proceeding including the use of a temporary injunction is provided, and those who

suffer as a result of the unfair labor practices are given an action for damages.

To provide for simplicity of administration by NLRB, my bill permits certain exceptions. Specifically, employes of competing employers located within fifty miles of each other and each employing less than one hundred persons are permitted a common bargaining representative. A strike of such employes is not included within the definition of a monopolistic strike against which the main provisions of my proposals are directed.

There is only one way that economic balance can be established. That is to enact legislation which would prevent, with minor exception, the combination of employes of competing employers for collective bargaining purposes. At the same time, we must prohibit any collusion on collective bargaining policies by competing employers. By such a law we will reduce the area of collective bargaining to the company and local level.

This does not mean that I favor anything approaching the re-establishment of the company-dominated union, although I daresay I will be so accused.

I have also been told that my proposal would fragmentize the unions—that it would destroy the role of the International union in labor relations. This is not true.

It is too well known that the labor monopolists are attempting to create a situation where, by economic coercion, they can secure from employers through government intervention more than could be obtained through free collective bargaining. They strive for such power that even the Government must yield to their demands. In no society of free peoples should such power exist. The monopolies of business were restricted years ago. The monopolies of labor must now be restrained.

Another vital problem in this field with which you in the mining industry are all too familiar is the domination of your unions by those who are not loyal to American principles. The Communist-dominated labor union must go!

The Taft-Hartley Act should be amended to provide that no Communist-dominated union should enjoy the benefits of the National Labor Relations Act. Such a prohibition would replace Section 9 (h) requiring an anti-Communist oath of labor union officers.

I believe it is not necessary to write a definition of "Communist-dominated" in the law. I would create a permanent Board to hear all the evidence, when any such charge is made by an interested party, and to find, as a matter of fact, whether or not a union is dominated or influenced by officers or others who are following the Communist-party line.

That fact, being certified to the NLRB, would be acted upon or not as the Board would see fit. But, if an affirmative answer was found, the NLRB would have to decertify or refuse to certify any labor union so found to be Communist-dominated.

I believe, further, that finding of Communist-dominated union should preclude the union from enjoying the benefits of the National Labor Relations Act for a period of at least three years.

Though it may be unnecessary, and perhaps even incongruous to include like provisions in the law aimed at Communist-minded employers, lest I be accused of discrimination, I would also include such provisions in this proposed legislation.

I should like to also call your attention to the constant demands of labor for Federal intervention in disputes that have arisen during the post-Korean emergency period.

The immediate threat of complete control of labor-management relations by the Federal Government has now been forestalled by a recent amendment to the Defense Production Act, depriving the WSB of its disputes authority. Nevertheless, American citizens should be constantly on guard against attempts to reactivate the WSB in the dispute field or to create a like agency with similar powers.

SHAFT SINKING; ROOF SUPPORT

Session Chairman

FRANK J. SMITH

Vice President

Oglebay Norton & Co.

Sinking Iron King's No. 7 Shaft

By E. R. TOMKINSON

Mine Superintendent

Iron King Mine

Shattuck-Denn Mining Corp.

EXTENSIVE diamond drilling at Shattuck-Denn's Iron King lead-zinc property at Humboldt, Ariz., showed it would be necessary to enlarge the present ore shaft, or sink a four-compartment steel and concrete shaft 420 ft northwest of the present main shaft. This location would place the new shaft well into the hanging wall and intersect the vein at the 15th level. It was originally proposed to sink this new No. 7 shaft to a depth of 2000 ft. At the present time sinking has reached the 350-ft level.

Due to increased labor costs and lack of old-time shaft men, mechanical mucking or other equally efficient methods had to be used. In new shafts in virgin country, mechanical mucking is the answer, but where the shaft is to be sunk relatively close to the mine workings and connections are needed, raising and raise stripping is feasible.

After the shaft location was decided upon, preliminary work was begun on surface and underground. While a 16-in. churn drill hole was drilled from the surface to 300 ft, a crosscut was driven on the 3rd level and raising was begun from the 6th, 7th and 15th levels. Churn drilling the pilot hole was much slower than expected, so as soon as the crosscut on 3rd was advanced to the shaft location a raise was driven up to meet the hole 50 ft above the 300 level. The raise on 15 was continued to 13, and as soon as the raise from 7 to 6 was completed, 8 to 7 was started. This scrambled raise program served several purposes. The lower levels were in early stages of development and the raises driven served for ventilation and escape until regular raises could be driven. The work on 7 and 8 provided a transfer to these levels, so waste material could be dumped into the gob system.

After necessary surface installations were completed, actual sinking on the 16-in. churn drill hole was begun on two shifts. A 6-in. H-beam 20 ft long was suspended in the churn drill hole by a one-in. cable and lowered to the bottom of the round before blasting. Each 6-ft round consists of 42 holes and is fired with electric primers. After the blast, the beam was pulled up through the muck to open the hole. After the hole was opened, the muck around the beam was barred and picked to the angle of repose, flooring was laid and a steel set blocked in line. The flooring was removed and a 5-hp slusher was lowered from surface and the muck scraped from alternate ends of the shaft into the centrally located hole.

This procedure continued through 80 ft of alluvium and 25 ft of decomposed schist. Very little trouble was ex-

perienced to this point, with the hole in some instances actually being open following the blast. However, when dense schist was encountered, the rounds had to be shortened to 3 ft. Shortening of the rounds did not slow the sinking as much as expected, since a 3-ft round could be drilled and blasted in less than one-half shift.

Raise stripping below the churn drill hole followed the same procedure, except no slusher was needed. The waste in the raise was pulled down enough to hold the round and the shaft bottom was practically cleaned by the blasting.

Total costs for 285½ ft of shaft below the collar set, of which 192½ ft were stripping, the 16-in. churn drill hole and 93-ft raise stripping, were: $134.67 and $134.84, respectively, including labor, explosives, steel sets, concrete and other miscellaneous expenses.

The stripping of the 16-in. churn drill hole was primarily experimental. Some difficulties were encountered. However, experience gained from 192 ft of stripping showed that this method could be used to good advantage up to 300 or 350 ft in depth. In longer holes, hang-ups might cause trouble. Up to 100 or 150 ft, raises are probably more efficient.

Success of sinking on a hole of this size depends largely on the man in the bottom and the character of the ground.

Choosing a Mechanical Mucker For a Small Shaft

By HAROLD B. SPENCER
President
Centennial Development Co.

MECHANICAL shaft mucking is commonly accepted practice today in any except minor undertakings, and a number of different types of machines and methods are available. Choosing the best method for a particular job involves a number of considerations.

Recently it was decided to deepen an underground operating winze in the lead-zinc-silver mine of the Chief Consolidated Mining Co. at Eureka, Utah. The shaft extended from the 1800 Level to the 2700 Level, plus a 50-ft sump, and plans called for sinking to the 3100 Level. Ground and water conditions were pretty well known and previous mucking in other shafts in the vicinity had been satisfactorily done with a pan and cage set-up It was decided to investigate mechanical muckers in an attempt to get more efficiency out of sinking labor.

Consideration was given to both the Riddell and Boskovitch muckers, but it was soon realized that practically all the conditions to be met would make them unsuitable. Both would require bucket hoisting, objectionable on three counts—lack of headroom, transfer of muck to mine cars, and less flexibility and safety in case of floods. Both also require relatively high capital investment.

Only shaft mucker which seemed capable of meeting the particular conditions was the Hydro-Mucker, developed for sinking by the Cleveland-Cliffs Iron Co. at the Mather "A" and "B" shafts.

The method of cleaning up broken material with the Hydro-Mucker met practically all of the particular conditions successfully in that it allowed use of a sinking cage and pan; was of low capital cost; was of small enough size to move easily through restricted mine openings. Also the shape of the shaft was such that the bottom could be covered without too much swinging of the clamshell bucket, even with the fairly large pump installation, which would be required as more depth was attained.

By mounting a second tugger alongside the one used for hoisting, with its line through a sheave at end of shaft opposite the cage end, the clam could be easily spotted any place in the bottom except directly under the cage. As few as three men could operate the outfit. The usual crew was four men and best efficiency was attained with this number in the bottom. Although experience with the outfit was limited, indications were that it would be trouble-free. The sinking job was halted by outside factors before much progress was made.

Application of the Hydro-Mucker to larger shafts sunk from the surface would be somewhat questionable economically. Its greatest advantage lies in the use of cage instead of buckets. Many feel that safety and efficiency of the former will outweigh any cost savings gained by the use of buckets. With an equivalent hoist, however, bucket hoisting and dumping is still a faster method of removing muck, especially as greater depths are reached.

Inclined Shaft Mucking at Sterling Mine

By F. W. SAUERWEIN
Mine Engineer
New Jersey Zinc Co.

FULL text of this paper appears on page 53 of this issue.

Roof Bolting at TCI

By L. S. CHABOT, Jr.
Works Industrial Engineer
Tennessee Coal & Iron Div.
U. S. Steel Co.

FULL text of this paper will appear in the November 1952 issue.

Rock Bolting Progress at Anaconda Copper Mining Co.'s Butte Mines

By LLOYD POLLISH
Engineering Research Department
Anaconda Copper Mining Co.

APPROXIMATELY 30,000 rock bolts have been used for ground support in the Butte mines since the start of the present rock bolting program in 1950.

There has been no major failure of any rock bolt installation to date.

Bolts have been used successfully in almost every type of underground excavation including drifts, crosscuts, tunnels, stopes, raises, shafts, pockets, and large underground rooms.

The standard rock bolt used for ground support in Butte is the one-in. diam slot and wedge type with lengths of 3, 4½, 6, and 8 ft.

Bolts are installed either by special crews or by the regular contract miners. Conventional rock drills are used to drill the holes and set the bolts. Bolts are tightened with impact wrenches and striking wrenches. The impact wrench is the most efficient tool to use for this purpose.

Although ground support is the main function of rock bolts, various other uses have been found for them such as suspension units for air and water lines, electric cable, and vent tubing.

Rock bolting in igneous rock shows much promise for the future in view of the work that has already been done. Continued research and promotion will be necessary however before its use in the metal mines will become as prevalent as it has in the coal mines.

Rock Bolting Program at the Sunshine Mine, Kellogg, Idaho

By WM. B. FOSTER
Engineer
Sunshine Mining Co.

FOLLOWING the symposium on rock bolting which was a part of the program at last year's Los Angeles meeting, serious consideration was given to the possible use of rock bolts at the Sunshine Mine.

To gain additional knowledge before the rock bolting program could be put into effect, we sought the advice of the Research Department of the Anaconda Copper Mining Co. at Butte, Mont.

I wish to express our appreciation to the Anaconda Research Department for having given so freely of their time and knowledge.

On February 18, 1952, the first rock bolts used at the Sunshine Mine were driven on the 3250 No. 4 Winze station. This station had been enlarged and would have required station sets to support 600 sq ft of open ground. One hundred and twenty bolts, 1 in. in diam by 6 ft in length were used, with ⅜ by 8 by 8-in. bearing plates and the nuts set to the maximum with an Impact Wrench.

On this particular job, the bolting pattern was required to support 25 sq ft of ground for every five bolts. To date, the ground is secure and no ground has sloughed from the bolted areas.

The same pattern of bolting has been used on all station bolting, and has given remarkable satisfaction.

Rock bolting in drifts and cross-cuts was started soon after the station work was well under way.

The hanging wall and foot wall of our drifts consist of the very siliceous St. Regis quartzite, laid in beds four in. to two ft thick.

Drifts in general strike east and west, with the veins and accompany shearing dipping 70° to the south. The shear zone in which the veins occur are along the steeply dipping north limb of the Big Creek Anticline. The bedding therefore in general dips 80° and steeper to the north with occasional slight overturning. The combination of the north dipping beds and south dipping schistosity, intersecting at a maximum angle of 30° produces a weak, slabby hanging wall. The bedding has a tendency to become loosened through exposure and shock, and large slabs slip or fall into the drift.

To overcome this condition, 6-ft bolts are installed in a fan-like pattern. The bolts are placed at centers of approximately 2½ ft on the cross section of the drift and each fan-like pattern is placed at centers of four-ft on the long section.

Each fan consists of six bolts, beginning at hip height on the wall and extending up the wall, across the back, and down the other wall. In some cases it is necessary to add one or more bolts to give the required support. This pattern has given remarkable service under the most severe conditions.

On July 16, 1952, a severe rock burst occurred in the vicinity of the 3700 and 3840 levels of the Sunshine Mine.

On the 3840 level, a section of the cross-cut, 100 ft long, had been bolted. The same fan pattern of bolting had been used, with an occasional bolt between each bolted section.

The rock burst knocked down a large amount of rock along the cross-cut, but within the bolted section, no rock was loosened or fell. This section of the cross-cut was thoroughly examined for broken or loose bolts. None were found.

In timbered stope preparation, rock bolts have been driven in the hanging wall of the drift under the stope and in the hanging wall of the first two floors of the stope to protect the stope timber from the crushing effect of hanging wall movement.

To test the effectiveness of this scheme, one-half the length of the first stope was bolted and the remainder was not bolted. Within one month after the stope was in operation, pressure was noted on the head boards in the unbolted section, while no pressure was in evidence in the bolted section. Four months after the experimental stope was bolted, heavy side pressure was noted in the unbolted section, while no pressure was in evidence in the bolted section.

To date some 5,000 bolts have been used at the Sunshine Mine, and with one exception, every use has given the support expected.

Some 50 bolts had been driven in the hanging wall of the first two floors of an experimental stope, that had been mined to the height required for the first gob. Since this stope had been in operation several months before the bolts were installed, the hanging wall had become loosened to such a depth that bolts were not effective.

In spite of all the success experienced to date, it should be understood that we are still working on an experimental basis, and no conclusion drawn at this time is to be taken as final.

Roof Bolting at Westvaco

By C. A. ROMANO
Resident Manager
Intermountain Chemical Corp.

ROOF bolting was adopted in the Westvaco, Wyo., trona mine of Intermountain Chemical Corp. on a carefully controlled experimental basis in July of 1949. Members of the Roof Bolt Control Section of the U. S. Bureau of Mines have provided helpful advice. Results obtained to date have upheld the conviction that greater safety and lower costs attend mine roof bolting. With the exception of minor installations, roof bolting has entirely replaced the conventional type of timber support in our operation.

With this method of roof support, engineering control must accompany the work—extensively at the start—and to lesser degree as experience and pattern develop. Almost without exception, all accidents attributed to the failure of roof bolts, have been due to improper use, control, and disregard of basic principles and rules.

The first bolts used in our mine were of the split rod

and wedge type made in the mine shop. These were quite successful and were adopted as standard method of supporting intersections. Meanwhile tests continued in rooms up to 20 ft in width. At Westvaco the orebody is overlain by several hundred feet of soft, thin-bedded shale, with no competent beds to which to anchor. Under these conditions bolting keeps the strata in the immediate roof from sliding along bedding planes and prevents, to a large extent, any tendency of the roof to sag or deflect.

Although most of the known types of bolts have been tested in our operation, experience indicates the split rod and wedge bolt to be superior for our application. A five-ft mild steel bolt, one in. in diam with a flame-cut slot 6¼ in. long in one end and five in. of standard thread on the other is standard in our operation. Anchor wedge is 6 in. by ¾ by ⅞ in. A ⅜-in. washer 6 by 6 in. sq is used and the nut is tightened with an impact wrench to 300 ft-lb torque against the plate washer.

Extensive experimental and test work has accompanied and continues in the roof bolting program in our mine. Included in this work is routine measurement of roof deflections in bolted areas, testing of various types of bolts and anchors and the determination of spacing patterns. Control bolts are tested periodically to determine the effect of time, moisture, and other conditions. Wedge type bolts have been installed experimentally by hydraulic pressure with the conclusion that those installed by impact with a stoper are superior in holding power.

Some of the principal advantages realized since the adoption of roof bolting as a means of roof support can be summarized as follows:

(1) Better support of the roof is obtained.
(2) Cost of support is decreased.
(3) Routine installation of roof bolts in regular pattern can be accomplished in less time than timbering.
(4) Roof bolting materials are less cumbersome to handle than timber.
(5) Storage space for materials is greatly reduced.
(6) Effective cross-section of entries and rooms is increased.
(7) Better housekeeping is possible.
(8) Cost of roof support with bolts has been found to be 20 percent less than the cost of conventional timber.

Since 1949 we have bolted an area of some 260,000 sq ft without a single failure of roof attributable to the failure of the bolts.

Special uses developed include bolting of floor and pillar corners to prevent spalling. Suspension of belt conveyor framework from roof bolts is standard practice. Bolts are also used to support ventilation doors and as anchors for lifting equipment.

A Highly Mechanized Shaft Sinking Operation

By C. KREMER BAIN
Consulting Engineer
St. Joseph Lead Co.

IN planning the Indian Creek shaft for the St. Joseph Lead Co. to develop a new property in Washington County, Mo., the driving motive was to approach as nearly as possible 100 percent safety as well as mechanization in order to eliminate some of the hazards and arduous work that usually accompany shaft sinking, and to build experience into the equipment to permit using unskilled labor.

Plans called for a concrete lined circular shaft 950 ft deep with an inside diameter of 12 ft 7 in. One 10-in. and four 4-in. pipe lines that would later be used for air lines, electrical conduits, etc., were placed inside the concrete wall and carried down as the shaft progressed. Use of these permanent lines during sinking operations eliminated the need for temporary ventilation tubing and service lines for air, pump discharge, etc. Four columns of H-beams were installed to function as part of the bracing for the steel concreting forms, and to serve as guides for hoisting and lowering the various pieces of equipment. These H-beams were prefabricated and drilled to a template so they could later be used as supports for the permanent guides. The permanent headframe was erected before the shaft collar was started, and every effort was made to eliminate temporary work which would later have to be replaced by permanent installations.

The equipment used in sinking operations consisted of the following:

(1) A four-machine jumbo drill with each machine independent of the others. A fixed angle between the feed and the arms, in conjunction with an indexing device, provided a fast and accurate method for spotting the holes to the proper pitch and depth.
(2) A mucking machine consisting of two air motors with spring loaded brakes mounted on a foundation at the surface, and operated by remote control from the bottom of the shaft where the operator had complete control of the clamshell while in a position to observe its operation closely.
(3) A double deck steel work cage with guide shoes that engaged the four H-beams in the shaft. In addition to serving as a platform from which the men could work at any point in the shaft, it also provided facilities for lowering pipes, steelwork, equipment, etc., and served as internal bracing for the forms while concrete was being placed.
(4) A template, "wing forms," and "fan tail jacks" were used to locate the H-beams in proper position where they could be jacked solid after plumbing.
(5) Steel concreting forms, one for each quadrant, were designed to be lowered inside the previously installed H-beams and wedged in place to make a solid circular form for the concrete. These forms were left in place until the next set of H-beams were installed, and then lowered to their new position.
(6) All electrical control wires were suspended from one steel cable and connected to a canopy. Lights and speaker for the communication system were installed in this canopy, as well as outlet plugs for the control wires for the mucker, electric hoists on work cage, signal system, and auxiliary lighting on work cage and jumbo drill.
(7) Auxiliary equipment:
    (a) A batch bin which accurately weighed sand, gravel and water which were fed into the bin by gravity from storage bins above.
    (b) A 54-cu-ft bucket, sliding shaft door, and hinged dumping door, which are practically duplicates of those used by Tennessee Copper Co. at Ducktown, Tenn.
    (c) A positive displacement Roots-Connersville blower designed to handle 4000 cfm at 2½ psi.
    (d) Blasting switch, grout pumps, sump pumps, compressors, drill presses, electric and acetylene welders, etc.

An average advance of 7 ft 4 in. per drill round without a single misbreak, which provided fragmentation that was ideal for clamshell loading, along with our record of no lost-time accidents during the entire sinking operations justifies the statement that the equipment and mehods came up to our expectations.

TAXATION: GOLD, SILVER AND MONETARY POLICY

Moderator, Taxation Panel

HON. THOMAS E. MARTIN

Member of Congress from Iowa

Chairman, Gold, Silver and Monetary Policy

DONALD H. McLAUGHLIN

President
Homestake Mining Co.
Chairman, A.M.C. Gold Producers Committee

Congress today is more aware of the need for building a healthy and vigorous mining industry than it has been heretofore, but has not yet fully realized the need for speed in attaining that objective.

Tax Panel

Panel participants from industry and Federal Government discuss taxation and the mining industry

Some Remarks on the Tax Picture and the Mining Industry

By HON. THOS. E. MARTIN
Member of Congress from Iowa

FOR thirteen years I have watched with alarm the feeble efforts and slow progress made by our Federal Government in stockpiling strategic and critical materials. Even more alarming has been the failure to realize the essentiality of a vigorous and healthy mining industry within our own country. The Stockpile Law recognizes the importance of conservation and development of sources of strategic and critical materials within the United States, but the Munitions Board which is charged with the administration of this law has not sponsored any program whatever to build up our domestic mining industry.

Under these circumstances it has become increasingly important that we develop tax laws that will aid in attracting capital to the mining industry. Severe shortages of some metals and minerals have given rise to the need for more favorable tax laws. Such legislation is made more difficult because of the tax situation confronting our Nation today which stems from excesses of recent years in Federal spending.

In 20 years of New Deal and Fair Deal spending, the Federal spending budgets have totaled $792 billions and the annual spending budget has now reached $85 billions for this fiscal year alone. The total increase in our Federal debt will be from $18 billion in 1933 to $275 billion at the end of the present fiscal year. The enormity of this Federal debt is a dire warning to us.

These developments over the past few years in Federal spending, debt and tax matters have raised many challenging problems that must be met straight-forwardly if we are to build sufficient strength into our mining industry to support adequately our industrial production. To attract needed capital to the mining industry, to carry out extensive exploration and development work as well as plant expansion reduced tax exactions and more liberal tax exemptions for the mining industry are needed. Laws unfavorable to the discovery and production of metals and minerals that should be removed without delay are:

(1) Excess profits tax.
(2) Limitations on the deductions of exploration expenses.
(3) Denial to stockholders of reasonable depletion allowances.
(4) Excessive taxation of so-called Capital Gains and the confiscation of capital.
(5) Denial of adequate depreciation.

HON. EDWIN C. JOHNSON
U. S. Senator from Colorado

WE are now in this year of 1952 living in a time when the tax in the United States has reached an all-time high. The significance of that is that many tax problems heretofore that may not have been of too much interest have now become of extreme interest because we have reached the point of diminishing returns in many industries.

Members of Congress realize that the expenditures of this country must be reduced if we are going to reduce the tax burden. In this year of 1952, with the highest tax burden of all time, we have a deficit of something in the neighborhood of ten billion dollars.

It makes for a sounder economy to pay as we go, and many of us in Congress firmly believe that expenses of this Government can be drastically reduced. This last Congress did reduce expenditures but not enough. I wanted to go ten billions deeper in tax cuts than we were able to go, but it's very difficult for a Congress or for any legislative body, to cut taxes and reduce expenditures. Lacking help from the Executive officers, the Congress is not going to be able to reduce taxes very much.

Taxes are a burden to all industries including mining. I am not going to advocate tax reduction with the argument that this industry should receive favorable treatment because no industry should receive favorable treatment. We do need tax adjustments in the mining industry, and I say that after sixteen years of experience on the Senate Finance Committee.

For the first years when I was on that committee, I was the only member west of the Mississippi River. I did my best on mining taxation problems because they were with us at that time, too; tried to work out adjustments with the able assistance of the Mining Congress and others who were very much interested in that, as well as many of my constituents at home in Colorado, and people in the mining industry throughout the West.

Four years ago something very important happened to our committee. Senator Millikin from Colorado became a member, and he is a stalwart member. He has taken hold of this great problem of taxation of the mining industry with an intense crusade, and I no longer feel lonesome on that committee. As a matter of fact, I have become a follower of Senator Millikin instead of the only person west of the Mississippi apparently interested in these tax problems. And I am very proud and glad to be a follower because he has assumed the leadership in this great work.

Congress some years ago worked out a policy for the

taxation of oil and gas production. Under that policy we have had splendid exploration of the gas and oil resources of our country. Not only has the Treasury received greater revenues from the gas and oil industry because of that policy, but the consumers of gas and oil have been able to purchase these necessities at a very low price.

With this shining example before us, I fully believe if we adopt a sensible, generous and wise policy of taxation towards the mining industry, we will have more revenue in the Treasury; we will be better able to take care of the defense of our country by the increased production of metals and minerals.

Congressman Martin mentioned the National Minerals Advisory Council and their splendid report. Almost every suggestion that the National Minerals Advisory Council made in its fine report was based upon what is already in effect in Canada where mining is going ahead and where exploration for mineral resources is advancing.

HON. JOHN W. BYRNES

Member of Congress from Wisconsin

THE formation of a Subcommittee of the Ways and Means Committee came from the idea that we hadn't looked at the administrative practices and procedures and policies of the Treasury Department and the Bureau of Internal Revenue for a long time, and certainly great changes had taken place in the tax laws and the tax base and the amount of revenue collected.

We knew that this was an area we should look into, and we knew, in a sense, what we were digging for, but we didn't know where to dig. We were assured by the Secretary of the Treasury, Mr. Snyder, and by Mr. Bolich, who is the principal spokesman for the Internal Revenue Bureau and Assistant Commissioner at the time, that everything was being operated in a satisfactory manner. There wasn't anything for the Committee to become concerned about. Let me say about that advice to us that I hope none of you have geologists who would give advice as misleading as the advice we received.

In over a year's operation we have only scratched the surface. We found corruption, incompetence, and divided loyalties in the Bureau which reflected itself in graft, favoritism and inequitable treatment of the taxpayers, and the Committee found its first duty was to get into the personnel problem and do some cleaning out.

We had, for instance, the case of Mr. Nunan, Commissioner of Internal Revenue from 1944 to 1947. He refused to testify before the Committee on grounds of possible incrimination. Investigation showed he had received $160,000 during the five-year period, '45 to '50, income that was unexplained and unreported. His case is now before a Grand Jury in New Jersey.

We have the case of Mr. Schoeneman, Commissioner of Internal Revenue at the time the Committee came into existence. Mr. Schoeneman resigned not long after we started our activities. His principal fault was that he saw no evil, heard no evil and spoke no evil of any of his subordinates.

There was the case of Mr. Bolich, the number two man in the Bureau, the Assistant Commissioner. He also refused to testify before the Committee on the ground of possible incrimination. He since has been indicted on a tax fraud charge and failure to report for evasion of payment of income taxes while he was the number two man in the Internal Revenue Bureau.

There was the Chief Counsel for the Bureau, really the number three man as far as importance and significance in the Bureau, Mr. Oliphant. Mr. Oliphant resigned when the Committee had some of his activities under investigation.

Of course, the next man of considerable importance in this machinery was the head of the Tax Division in the Department of Justice, which has to do with the legal aspects of prosecution of tax fraud cases, for instance, and also, defense as far as the Government is concerned in actions brought against it. Well, I think you know something about Mr. Caudle's activities. He is now on the stand before another Committee in Washington at the present time with regard to some of the activities of the Justice Department. In fact, it was our disclosure as far as Mr. Caudle and the operation of his division that gave rise to the further investigation by the Judiciary Committee of the House of Representatives into the operation of the Justice Department as a whole.

In addition to these people, since January, 1951, there have been 217 persons who have been fired, suspended or resigned under investigation; 12 out of 64 collectors. Your collectors are the top men in each state. There was a total of 217 in the last year and a half whom we have had to suspend or resigned or were fired who were under investigation.

HON. CARL CURTIS

Member of Congress from Nebraska

HERE in America we have trouble on hand fighting a losing war. We have lost a lot of the world. Our debts are going up. Taxation is destroying private enterprise. Rep. Byrnes has told you about the scandals in the tax collecting field, not only of outright corruption, but negligence, incompetence and favoritism in high places, where taxes in San Francisco, for instance, little tax matters were fixed just like parking tickets were fixed. In New York City the tax collectors bore down upon foreign born and ignorant people and blackmailed them out of their savings.

What's the remedy? That's what I want to talk about for three or four minutes. The greatest asset that came out of this tax investigation was that it threw the light of public opinion on the situation—the most important thing in the Federal Government is public opinion.

When our investigation began, I asked Secretary Snyder, "What method do you have of checking upon your own tax collecting set-up?" and his answer was a humiliating one. He said, "Up until the new one we are just getting started, we haven't had any."

The Treasury came out with a reorganization plan. It's going to be a disappointment. It will increase the power of the Secretary of the Treasury over the Bureau of Internal Revenue, and there isn't a tax man who doesn't know that the Bureau of Internal Revenue has fine, capable men who lots of times wanted to do something, and the higher echelon turned it down because either they didn't understand or it didn't fit in with the political, economic philosophy that they had.

They put the collectors under civil service. That may be all right. I supported it. But, it's not the answer. Nine-six percent of the people who lost their jobs by reason of our investigation of the tax scandals were already under civil service.

What do we propose? If we are to have the type of tax collection machinery that your industry is entitled to, that every industry is entitled to, the tax collecting machinery has to be taken completely out of the Treasury Department.

The Treasury Department is a political department. They manage the national debt. The Secretary of the Treasury is a part of the President's Cabinet, a political office designed to perpetuate an administration in office. The Treasury Department should recommend to Congress what kind of tax laws they want, certain general policies and so on, we need a tax collecting machinery that is apart from the political aspects of any administration, whether it's your party or my party.

We need a tax collecting agency that will nearly as possible try to do justice between the taxpayer and the government, a court-like agency, whose objective would be to carry out taxation under law and not by men. At the present time the final answer to tax questions and tax problems is determined in a political atmosphere.

We should have an independent Bureau of Internal Revenue Commission. It should be headed by three men approved by the Senate, not more than two from one political party, and have staggered terms of about nine years so that each new man would serve longer than the man who appointed him, and that those men would be charged with the collection of taxes—not political obligations—and would carry out a program. Many changes will perhaps have to be made before such an independent agency can be carried into effect.

H. B. FERNALD
Loomis, Suffern and Fernald
Chairman
A.M.C. Tax Committee

TAXES become road-blocks to mineral production as they reduce or kill incentives. Taxes never give incentives but taxes can kill incentives which otherwise exist.

What is the incentive to find, to develop and to produce the metals and minerals so they may be of use to mankind? I speak not of a regimented, controlled, socialist economy; but of the incentive of free men which has made this West so great and has yielded the products to make possible the industrial activity of our entire country, our high standards of living, our prosperity and our defense.

This incentive has come and must come from the hope of an ultimate return which will repay the investment and yield a profit sufficient to make worth while the investment, the time, the effort, the ability and the risk involved. It is the hope for the occasional success which will compensate for the many failures.

The incentive comes only from the hope that, in spite of the risks, a successful result may be achieved. But if we have that hope that the natural and inherent risks of discovery, development, production and prices can be met, then we face the question of taxes. To what extent will they impair the incentive for incurring or continuing the risk? The result to the investor is only that which remains after taxes. If the investor is the stockholder in a corporation, as is the most common case, we must look at taxes on the stockholder as well as on the corporation. Let us take only two short illustrations.

If the income tax takes 50 percent of the corporation's earnings, and the individual's tax takes 50 percent of the remainder (as it will in the $14,000 bracket), taxes will take 75 percent of the earnings, leaving only 25 percent for the stockholder. The corporation must then earn four times as much as otherwise would be required to give the stockholder an incentive for his investment.

If corporate income and excess profits taxes take 70 percent of the earnings, and the individual tax takes 66 percent (as in the $22,000 bracket), taxes will take practically 90 percent of the earnings, leaving only 10 percent of them to the stockholder. Then the corporation must earn ten times the amount needed to give the stockholder incentive for investment.

Under such conditions we must ask not merely if the project for exploration, the prospect for development or even the operation or expansion of the producing mine offers hope of yielding enough profits to give incentive for investment, but we must ask if it offers hope of yielding four to ten times enough.

Taxes affect not merely equity investments in mines and prospects. They also seriously affect ability to borrow, because taxes come ahead of repayment of loans.

There are too many who never have taken and never expect to take the burden and risk but urge that mines should be so treated.

Fortunately we have had in Congress those who recognized the mining problem and the need for mineral production, and believed in the profit incentive principle. Some are here on this panel. There are others. To all of them we are deeply indebted.

The difficulties and uncertainties of requirements and interpretations, the prospect of long continuing disputes, these and other features of poor tax administration make it difficult for investors or operators to foresee what the tax take may be and the allowance which must be made therefor in passing upon projected investments and activities. Necessarily there must be some uncertainty, but the greater the uncertainty, the greater is the risk allowance to be made therefor in investment or operating plans. This also is one of the road-blocks.

L. J. RANDALL
President
Hecla Mining Co.

ONE of the major problems confronting mine management today, is that of retaining a sufficient share of operating profit to provide the means for exploration and development of new mineral deposits.

It should be apparent to any sound thinking business man that tax rates of from 52 percent on normal profits and 82 percent on so-called "excess profits" are excessive. The amount retained after taxes is insufficient to provide the funds required for prospecting, exploration and development of new deposits.

Where can the industry hope for a solution to our problem of finding new ore reserves except through amendment of tax laws? Operating costs are not expected to decrease. It is becoming more and more difficult and expensive to locate commercial mineral deposits. In the Coeur d'Alene district it is not uncommon to expend $1,000,000 or more for shaft sinking and lateral work before we even encounter mineralization of any consequence.

Thanks to some good friends in Congress, amendments were made in 1951 to permit a deduction for exploration costs up to but not to exceed $75,000 each year for a total of four years, and a full deduction is now allowable for development costs.

These amendments have been helpful. But the limitations on deduction of exploration cost must be removed. No single change in our present federal tax laws would do more to encourage and bring about the discovery of new mineral deposits than an amendment to make the cost of exploration fully deductible. Under present laws there is often a great deal of uncertainty as to how we should distinguish between expenditures for development and expenditures for exploration.

The decision by management to go ahead on a project

may turn on the narrow distinction to be made between exploration and development expenditures. If the project is undertaken and is successful, the government will realize its share of the revenue therefrom and a new mineral deposit will have been discovered. This will never occur unless the project is undertaken.

The President's Materials Policy Commission has recommended the removal of the limitation for deduction of exploration costs and Congress should lose no time in amending our tax laws to carry out that recommendation.

You may have noted that during my entire discussion I haven't even mentioned the shareholder. He becomes a forgotten man to many of us until we are placed in a position where the shareholder looks to us for a return on his investment. Net profit retained after taxes must be sufficient, not only to provide the Corporation with funds for new mining ventures, but must also be adequate to permit a reasonable return to the investor.

ELLSWORTH C. ALVORD
Alvord and Alvord
Tax Counsel
American Mining Congress

I WOULD like to give you my summary, based on the policies which you hear urged from Washington, and the policies which you hear urged by the American Mining Congress.

I must caution you that in Washington we have a strange new language. It sounds somewhat, at times, confusingly, like English. But it is not English as you are accustomed to understand it. Therefore, I must act as interpreter for you.

When I say "We in Washington," I mean the program planners and the policy makers in the executive branch of your Government. When they say that we in Washington insist upon honesty in the administration of our tax laws, for example, what they really mean is "honesty" determined under a new rule for official conduct. The primary test now is "don't get caught."

When we in Washington say "we are against inflation," we mean that we know that inflation is politically popular, and will feed inflation to you just as long as we can deceive you with assurances that it will never get beyond control.

When the American Mining Congress makes that statement, it means that every one of the many policies intended to promote inflation be abandoned and that we get back to common sense revenue and fiscal policies in lieu of emergency powers, and common sense controls over so-called emergency powers.

When our program planners and policy makers say "we are for small business," what they really mean is that they want the small businessman to come to Washington to ask for help. We will put him in a straight jacket for an indefinite period of time so that he must come to us for more help.

What the American Mining Congress means is, free your small businessman from the terrific restrictions and requirements of bureaucratic laws and regulations and give him a chance to run his business, to prosper and advance, to compete, and to live.

When the Treasury says, "we will give you a tax system which will permit the continuation of our system of private enterprise," what the Treasury means is "We want tax laws which will stop growth, expansion, increased production, research, new products, new markets, lower prices, and everything that gives us our private enterprise system of today. We will even deny to your sons and daughters an opportunity to start a business of their own."

What the American Mining Congress means is, first, repeal the excess profits tax immediately. Its provisions were dictated and its basic policies were decided by the C. I. O. It was rammed and jammed through the Congress. If it had not been for the Congress and its staff, you gentlemen would have seen an 80 percent rate imposed upon substantially all your profits.

And then we say, give the Congress an opportunity which it has not yet had to remove many of the inequities and hardships intended by the Treasury and remove some of those that were not intended, and do that retroactively so you will have, during the period of its existence, a tax which is really directed toward excess profits determined by common sense measures.

When the Secretary of the Treasury says, "I will take only a reasonable portion of the normal profits of business today. I know that business must be financed by what they have left after they pay taxes; it's very difficult for business to sell securities today because the yield after taxes is simply not adequate." What he really means is, "I want to be a partner in your business, take more than fifty percent of your profits, and share none of your losses." What he really means is, "I won't nationalize you the way Britain did. I will nationalize, socialize, your incomes, and then I will draft you as executives to carry on the job and carry the responsibility—so I can not be criticized if my system fails. Furthermore, I will discourage all younger men from an ambition for promotion and from a desire to take your place some day."

Oh, you will hear all of this denied in Washington. All our program planners and policy makers say we are strongly for the same things you are for and against the things you are against. Of course, for example, we are strongly against confiscation. But what they really mean is, "We have already confiscated about fifty percent of the value of your savings and your insurance and your earnings. We are going to continue probably to a point where the dollar will be worth 25 cents. And more than that. If any of you gentlemen are smart enough to put your savings in an investment which will give you some sort of a hedge against inflation, then the Secretary of the Treasury says, "I will confiscate your savings by insisting that when you sell, you pay a normal tax and surtax rates on the money which represented your savings and your investment. I will take it all."

S. H. WILLISTON
Vice-President
Cordero Mining Co.

WE have expressed our needs in the line of mine taxation, and we have had a very favorable reaction and a great deal of consideration, especially from two of the men who are here on this platform today.

A strategic metal, as distinguished from a critical metal, is one that we have so little of available to us in time of war that even though we took all of it away from the civilians, we wouldn't have enough for the military. Dollar-wise, the strategic metals don't amount to too much, but military-wise, they do.

In 1943 we were self-sufficient in mercury. Today, we import 90 percent from Italy, Yugoslavia, and Spain. Last year we produced 30 percent of our requirements of antimony and 70 percent was imported from Bolivia, Mexico, and South Africa. Today we import 100 percent of our antimony. Bolivia's mines have been nationalized.

The African properties have been curtailed. The only domestic production has been shut down, and the Mexican mines are closed.

In regard to manganese, when Korea-day occurred two years ago we imported 91 percent of our manganese from the east coast of South Africa and from India primarily. Today due to the increase in consumption, instead of importing 91 percent, we import 92 percent.

In regard to chromium, two years ago we imported 100 percent of our chrome requirements. Today, as the result of activities now in operation, we import only 99 percent. The balance of that chrome comes from Turkey and from the east coast of South Africa. I will leave to your own imagination how long that might continue.

I could go on. Tungsten in 1943 as related to today, we are producing half of what we did in our peak war year. We are producing an insignificant portion of our own requirements according to the latest figures from Washington, and yet, we are the largest tungsten producer in the world, if my memory serves me right—a toss-up as to whether we are first or largest—but still we only produce a very small proportion.

Now, I would like to call your attention to the last two years. When we needed antimony, we couldn't get it. When we can get it, we don't need it. When we needed copper from Chile, we couldn't get it. When we don't need it, we can get it. When we needed tin from Malaya, we didn't get it until the RFC stopped buying for a period of a year. Later we got it, when the essential need was not nearly so urgent.

We have too many policies in Washington that the mining industry can't put together. The Congress had told us that we should develop where possible within reasonable economic conditions everything possible within the United States. The State Department has told us that we should buy everything abroad. For seventeen years they have had the policy of increasing imports. If the market remains the same, that means reducing domestic production, and I want to congratulate the State Department—they have been in seventeen years most successful.

The Paley Commission report is in effect a continuation of the State Department policy of buying abroad. The one recommendation in the report of the Commission, the complete elimination of tariffs for the domestic mining industry where their costs are protected by tariffs and their prices are not, would mean in effect the export of the industry.

The fourth policy we have in Washington, that of the Office of Defense Mobilization to which has been transferred all of the emergency agencies, is that we should do nothing about any mineral if the world supply is satisfactory regardless of where it may come from.

Hard Money Versus Inflation

By HON. FRANCIS CASE
U. S. Senator from South Dakota

I SHALL not assert that restoration of the gold standard with free convertibility will totally control inflation. I do assert, however, that gold can police inflation. The absence of the full gold standard did not produce inflation; it only removed what might have been a helpful brake.

Once you let government financiers find how easy it is to pay bills by printing dollars instead of producing them, financiers become politicians. They play Santa Claus. It becomes easy to forget that government cannot give anything to anybody it does not take from somebody.

The point was neatly made in a panel discussion some time ago, when Congressman Howard Buffett of Nebraska said: "A currency redeemable in gold on demand seems to be the right on which all our freedoms ultimately rest. It enables the people silently, but effectively, to protect the fruits of their labor."

Paley and associates could have gotten their idea of an "international buffer stock of minerals" from the gold at Fort Knox, but at least they do not propose to deny individual citizens the right to own, to buy and to employ the minerals they would stockpile, nor to restrict such rights to citizens of other countries.

There was a lot of nonsense fed the mining industry and the public along in 1935 and 1936 about the gift of the New Deal to gold miners by increasing the legal price from $20.67 to $35 per ounce—but the cold facts are that gold was selling on the markets of the world for far above $20.67 for many months before the change in the U. S.

The hard-rock producers are in the same position today. The world market is reserved, by our unilateral action for the producers of the exchange-short countries whose budgets we balance with gifts, and for the gold turned out by the Kremlin's slave-miners.

We have tried a lot of devices in place of gold and learned some interesting lessons.

A year ago the International Monetary Fund gave up a four-year struggle against the premium price being paid for gold in the open markets outside the United States. Despite its objections more and more gold flowed into the premium markets, reflecting the searching of people for a reliable store of value.

The Bank for International Settlements has estimated that of 4,870 millions of dollars in gold produced in 1946-1951 inclusive, more than half disappeared, and that of this, 1,490 millions went into private hoardings.

Last September, the International Monetary Fund, announced that member countries could decide for themselves how to implement the gold policy.

The best way to reduce the demand for gold hoards is to follow budget and credit policies that will give people confidence in their currency and the best way for a government to give people confidence in its currency is to make it freely exchangeable for gold.

And that is precisely the whole point—gold combats inflation if allowed to work. Convertibility is the pledge of not spending money beyond the point which current revenues and low-interest bonds will meet.

There are three reasons why our own government does not face up to this situation. (1) Pride of Authorship, (2) Problem of Pricing, (3) Inertia of Position.

Having spawned the idea that gold was nothing for the private citizen to have, that public debt meant nothing if the money was owed to ourselves, present government policy-makers cannot quite bring themselves to admit that they were mistaken. If the policy-makers are reluctant to restore full recognition to gold, the policy-makers can be changed. The remedy is that simple.

This problem of pricing is not easy—but not unsolvable. Senator McCarran of Nevada has suggested that a trial period would let gold find its level. Other possibilities would include either a direct mandate by Congress or the creation of a commission to make a finding upon the basis of precise standards prescribed by the Congress.

Perhaps the entire matter of price can be threshed out in the Congress but the possibility of speculation might argue for the use of the agent to make a finding upon prescribed standards.

In any event, Congressional action will be needed but it will require executive leadership to overcome the third problem—the Inertia of Position.

The time has come when the economist, the engineer,

the financier and the miner must join hands in saying to the next administration that the welfare of the country demands recognition by the United States of the full part that gold can play in combatting inflation and in restoring economic health to the nation.

Gold and General Economic Trends

By B. BARRETT GRIFFITH
Colorado Springs, Colo.

WHEN the doctor used to say, "You are sound as a dollar," we ran out of his office feeling fine, Today, such a remark by our doctor should scare us to death.

This may describe the skepticism with which you and I should look at all dollar statistics as well as Paley Reports. New peaks in total deposits and currency, high turnover of demand deposits, and record loans by commercial banks are not reason for optimism.

Dollar statistics to the contrary and notwithstanding, prosperity does not come from printing presses nor from the high turn-over of the money supply.

People are restive under conflicting Washington pronouncements. As individuals, we are told that gold is useless, worthless and old-fashioned. And, in consequence, paper money issued by political administrators is superior as a medium of exchange. We are confused by conflicting statements which, on the one hand, insist that gold is useless, but, on the other hand, emphasize the fact that trade balances between nations are settled by gold.

We hear political statements to the effect that political policies and schemes during the last 20 years have resulted in social gains, including full employment, high wages, etc. But the public's attention is not called to the fact of the dollar depreciation which has meant tremendous losses to insurance policy holders, savings account depositors and holders of U. S. Government securities.

Consumer prices since 1932 are said to have only about doubled by the Bureau of Labor Statistics. I do not believe it. National income has increased five-fold, according to the government statistics, but if it has, why should individual debts have increased five-fold during the same interval?

Financial hocus-pocus to the contrary and notwithstanding, gold retains its value in the minds of men. There is reason for this. Gold has been used through history, as a measure of wealth and for the protection of the little man against government.

The American public has lost a birth-right—the right to convert paper dollars into gold, and thus control government expenditures. Since the mid-1930's, the public has permitted the politician to write checks on its bank account.

History proves trade between people and nations is a continuous thing. It is either carried on peaceably or through seizure of goods by war. Peaceful trade requires a medium of exchange in which all people have confidence. Until currencies are freely convertible into gold, confidence in currencies will be lacking and peaceable trade impossible. If Russia owns half of the world's gold, and the Western Powers half of it, there may be hope for peace and trade, if paper money managers are replaced by sound money in which all people have confidence. But we must first obtain convertibility and then let gold price and peaceful trade opportunities unfold. To survive, the little man must and will end the era of thoughtless bureaucrats.

ADVANCES IN MILLING PRACTICE

Session Chairman
ROY A. HARDY
Consulting Engr.
Getchell Mine, Inc.

Treatment of Complex Lead-Zinc Ores in the West

By BLAIR L. SACKETT
Metallurgical Manager
International Smelting & Refining Co.

THE treatment of complex lead-zinc ores, which occur and have been mined in large tonnages for many years throughout the western part of the United States, has always presented a real challenge to the metallurgists responsible for the production of maximum amounts of lead and zinc from such ores. In the years prior to 1924 and the development of the successful application of preferential flotation for lead and zinc sulphide minerals to custom ores at that time, many known deposits of these complex lead-zinc ores could not be commercially mined because of the high zinc penalties charged at lead smelters as a result of serious difficulties encountered there due to the presence of relatively high zinc in such ores.

The introduction and consequent growth of lead-zinc sulphide preferential flotation gave great impetus to the mining and treatment of such complex ores throughout the west and has added greatly to the economy of the mining industry. Historically, economically, productively and, to a limited degree, technically, this period had a stimulating effect on the industry. The successful flotation of oxidized lead minerals from complex, oxidized lead-zinc ores and from partially oxidized, lead ores are considered and, at the same time, attention is called to the great difficulties encountered in the, so far, futile search for a commercially successful method for floating or otherwise concentrating the non-sulphide zinc minerals.

In the past ten years or so, many complex, non-sulphide ores of lead and zinc have been successfully treated in certain lead smelters where a slag-treating plant is an adjunct to the smelter, or in the slag-treating, fuming furnaces themselves. Only ores which are not economically amenable to either bulk or selective flotation fall into this category.

The men who have brought the treatment of these complex ores to their present state of "imperfection" are legion and they have really accomplished a great deal toward the ultimate satisfactory solution of this difficult problem on which further, important advances will, no doubt, be made before too long.

Milling Methods at Hayden Concentrator

By J. L. STEVENS
Mill Superintendent
Ray Mines Div.
Kennecott Copper Corp.

FULL text of this paper appears on page 46 of this issue.

Improvements in Milling Practice in Southeast Missouri

By NORMAN A. STOCKETT
General Mill Superintendent
St. Joseph Lead Co.

THE most important and largest recent improvement at the Federal Mill is the elimination of six sets of face dry crushing rolls and the replacement of this equipment by five long wet grinding rod mills. Elimination of the rolls and the dry screens will increase the capacity of the secondary crushing plant from about 650 tph to 1000 tph. It will then be possible to operate the crushing plants on a two-shift rather than a three-shift basis.

The increased crushing rate permits more tons of ore to be hoisted, eliminating many of the delays in dumping ore trains underground due to a full pocket. It is estimated that after conversion, it will be possible to make a net reduction in the mill organization of 20 operating and maintenance shifts per 24 hours besides eliminating the large cost of replacing dry screens, maintaining the switch back conveyors to the dry screens, etc.

Six Symons' short head cone crushers, set to make a one-in. product, produce the feed for the rod mills. To obtain finer crushing, a step mantle and a step bowl liner are being used in one of the crushers. This change is satisfactorily making a finer sized product.

A mechanical roll welding machine has been in service several years at the Federal Mill for hard surfacing roll faces. Rolls from five different mills are hard surfaced here. Several savings are evident: machine welding requires only 25 percent of the time needed for manual welding; welding is deeper, more uniform, and wears longer; visible arcing has been eliminated, saving eye injuries; and a large reduction has been effected in the cost of hard surfacing rolls per operating day.

A water tank about 90 ft above ground level has been replaced by a group of pumps, each one designed to elevate water in the plant only to the horizontal zone or level at which it is used. A power saving of approximately $100 per day has been made possible by this conversion.

Disc filters are gradually replacing the drum or cylindrical type of filters for dewatering flotation concentrates. Wet instead of dry vacuum pumps are being used in the latest filter installations. To reduce maintenance costs, seven 48-in. spiral classifiers have replaced the drag classifiers at Federal for dewatering table tailings.

A sink-float plant has been constructed at the Hayden Creek mill and has proven to be the most economical method of processing Hayden Creek ore. In addition to the many savings regularly made by the use of the sink-float process, such as reducing the tonnage of ore to be hauled and milled, there is a large potential market for the discarded crushed granite for concrete aggregate ballast for railways, etc.

Milling Tungsten Ores at the Getchell Mine

By KEITH KUNZE
Mill Superintendent
Getchell Mine, Inc.

THE critical shortage of tungsten concentrates available to the Free World at the outset of the Korean War was met by a tremendous expansion in domestic production. The incentive for additional production was the price increase from $28.50 per Short Ton Unit to $63 per STU and DMPA's program guaranteeing this price for five years. The rigid specifications set up by the DMPA on tungsten concentrates compelled many new operators to work out improved methods of tungsten ore beneficiation or sacrifice a big percentage of their economic return.

Historically, tungsten ores have generally been concentrated by simple gravity methods. Gravity concentration has the advantage of producing a high grade concentrate, relatively free from impurities, but has the disadvantage in returning a low percentage of recovery in most tungsten ores. The adoption of flotation as an adjunct to or a replacement of other concentrating methods has only taken place in the last 15 years. Though great strides have been made in the flotation of tungsten ores, few of the low grade, disseminated domestic ores can be selectively concentrated to acceptable grades by flotation alone. A supplementary chemical treatment is necessary to eliminate the impurities.

The Getchell mill, which had previously milled gold ore, converted part of its plant in December, 1950, to the recovery of scheelite by straight flotation and then set up a procedure to refine the flotation concentrate by a combined acid leach and flotation in the acid circuit. Close control featured in both the initial concentration plant and the acid leach circuit has resulted in a high percentage of recovery into a government acceptable concentrate.

SPECIAL CONFERENCE ON STRATEGIC MINERALS

Session Chairman
S. H. WILLISTON
Chairman, Strategic Mineral Committee
American Mining Congress

Strategic Minerals and Metals

By S. H. WILLISTON
Vice-President
Cordero Mining Co.

WHAT is the Government policy regarding the production of strategic metals within the United States?

Two years ago secret Government instructions were given to make no increases in production unless there were world-wide shortages. No significant increases have been made except where there were world-wide shortages. We may presume, then, that our Washington Government does not expect a war and never has.

The experiences of the last year and a half have shown conclusively that when we want and urgently need metals from abroad we do not get them and when we do not need them they come into the American market to depress price and close down domestic plants.

In 1935 the Government declared its policy of increasing the raw material supply from abroad and consequently decreasing the need for minerals from domestic sources. Metal tariffs have directly, or indirectly by depreciation of the dollar, been decreased by 80 percent or more.

Ceiling prices have been placed on domestic production; none on foreign production. Materials for the stockpile have been obtained abroad and domestic producers have been refused the opportunity to supply metal at the same price.

The domestic mining industry, strategic or critical, cannot compete in a free world market when their labor and operating costs are controlled by protective tariffs and politics, and their product has no price protection. So long as those Government policies continue, underground metal mining within the United States, with few exceptions, is faced with an unhappy and unhealthy future, if it has any future at all.

Tungsten

By CHAS. H. SEGERSTROM, JR.
President
Nevada-Massachusetts Co.

A 12-YEAR tabulation of domestic tungsten production and consumption shows an average of 50 percent of the amount consumed was produced in the United States. This ranges from 33 percent in 1941 to 72 percent in 1946.

Because tungsten is one of the most critical metals in the armament program, the percentage of consumption produced in the United States is very important. The tariff has been the most important factor in maintaining a fairly sound domestic tungsten industry. However, as recently as 1949 many of the producers were forced to shut down due to lack of demand and low prices. It has never been proven that the elimination of the duty would increase supplies available to the United States, nor does the fact that all tungsten will come from abroad mean that prices will be lower. The only sound policy for the United States is to maintain the duty in order to allow the United States producer to compete with foreign producers.

Antimony

By JAMES P. BRADLEY
Vice-President
Bradley Mining Co.

THERE is practically no domestic mine output of antimony at present. Due to the depressed antimony market caused by heavy liquidation of foreign antimony inventories, the major domestic producer discontinued operations recently. This property has a productive capacity of about 4000 tons per year, equivalent to well over 90 percent of domestic mine output, 20 percent of peacetime demand and 10 percent of wartime requirements.

With China out of the picture, the main foreign sources for the United States and the rest of the Free World are Bolivia, Mexico and the Union of South Africa. Due to the gradual exhaustion of the better grade deposits, Mexican antimony production has been declining in recent years and a steady decline in future production can be anticipated.

Although the national stockpile contains about 20,000 tons, only six months' emergency supply, it has been announced that the stockpile objective on antimony has been completely fulfilled.

The National Security Resources Board Report of March, 1951, recommended that at least 40,000 tons be stockpiled. However, considering the uncertain outlook for domestic mine production, it would seem safer to have several years' emergency supply in the stockpile.

Chromite

By F. W. LIBBEY
Director
State Department of Geology & Mineral Industries
Portland, Ore.

DOMESTIC production of chromite at the start of the Korean war was practically nil. The current rate of production is estimated at 25,000 tons per year, all from California and Oregon on about a fifty-fifty basis.

When the Montana project of the American Chrome Co. gets into production, scheduled for 1953, the company will produce 900,000 tons of concentrates over an eight-year period. In 1954, if we produce 112,000 tons of Montana chrome and 50,000 tons of Oregon and California chrome, the domestic production rate would be about 13.5 percent of total domestic chrome consumption.

Since conditions governing building up of production contain many uncertainties, probably an effort will be made next year to obtain an extension of the government chrome buying program.

Mercury

By GORDON I. GOULD
San Francisco, Calif.

DOMESTIC production of mercury in the fourth quarter of 1950, soon after the outbreak of the Korean War, was an estimated 639 flasks—consumption in this quarter was 15,000 flasks. Today, two years later, we have an industry still nearly as dead as in 1950—even more uncertain as to its future, and certainly not one encouraged to develop its productive capacity to anything like reasonable sufficiency for domestic requirements.

One of the most significant factors contributing to the plight of the domestic producer is the wholesale importation of the metal from European producers.

Unless, and until, importation of foreign metal is controlled to such an extent that the American producer can be sure that he is not at the mercy of foreign production, the United States does not have a very bright future.

Manganese

By P. R. BRADLEY, Jr.
President
Pacific Mining Co.

WHILE over 90 percent of our manganese is bought abroad, this country—at a price—can be made wholly self-sufficient. The jeopardy of foreign manganese supply in case of war is immense—60 percent of one fleet of ore-boats was sunk in World War II. Marine transportation may cease to exist in the next war.

A successful domestic manganese program requires a high understanding and informed authority behind proper program mechanics. Today in the authority of DMPA and in the person of Howard Young we appear to have approached the first requirements—program mechanics are still backward and alternation is demanded if an important degree of national self-sufficiency is the goal.

It must be pointed out that the present total goal of area programs plus the National program, if all are 100 percent successful, is to produce less than 750,000 tons of metallurgical grade ore over the four-year life of the program. This amount represents less than 10 percent per year of the quantity being consumed.

Much more must be done if manganese production is to be given significant stimulation. An increase in the tonnage aims of the low-grade programs and a lengthening of their life, because of the investment required to put mines in production, should be the first step in the current program.

URANIUM MINING—ATOMIC ENERGY

Session Chairman
T. M. WARE
Chief Engineer
International Minerals & Chemical Corp.

New Developments in Uranium Mining

By BLAIR BURWELL
President
Minerals Engineering Co.

THE search for uranium ores began over forty years ago, when the first atomic breakdown of uranium to radium was discovered by the Curies, and there is not a major producing source of uranium today that was not known before the atomic bomb. Since World War I the uranium mining industry of the Colorado Plateau has grown until today it is ten times larger than it was then. It is maintaining its position as the principal source of American uranium and the center of most of the search for and processing of ores.

Of rapidly increasing importance in potential of production is by-product uranium production from phosphate rocks, shales, black sand or other sources, where other mineral products bear the cost of mining and processing.

In the field of exploration new developments in diamond drilling involve new drill rigs to increase mobility and drilling speed. Specially designed wagon drills are replacing diamond drills for holes up to 100 ft deep, and new units may increase the range to 250 ft. The majority of exploratory diamond drilling is done by the Government, and the largest part of trend drilling, either diamond or percussive, by private enterprise.

Drilling in the Plateau has greatly extended the known ore zones and trends in Colorado and Utah and located new ones. The most important discoveries have probably been in extensions of the Jurassic-Triassic sediments to the south in New Mexico and Arizona.

Ore discoveries in the Navajo Reservation appear to be substantial. They have high-lime content and present metallurgical difficulties. In the Grants area, a plant is under construction to treat these high-lime ores.

Deeply buried Triassic beds in the Grand Canyon and its tributaries have been prospected by air-borne radiation detection devices, with new and promising discoveries west of Moab, Utah.

Outside the Colorado Plateau many uranium deposits have been found, but have not reached the development stage. An important new area may develop from the Lakota deposits in South Dakota, Wyoming and North Dakota. An AEC ore-purchasing depot is under construction at Edgemont, S. D.

New developments in mining consist mainly of mechanization in larger mines over 50,000 tons. In smaller mines considerable ingenuity is being shown in devising rubber-tired haulage to meet the increasing problem of ore tramming. With increasing depth of overburden in the Plateau, shallow inclines and tunnels are being replaced by vertical shafts. Drilling of ore is done mainly by Air Feed Legs and light drills, using one-in. hex. alloy drill steel with tungsten-carbide bits of the chisel type.

The increasing depth of uranium mines has focused attention on the danger from radon gas. It is probable that any ventilation adequate for mining will remove dangerous concentrations of the gas.

Developments in extractive metallurgy of uranium have lagged behind the discovery of new deposits. The principal problem arises from ores high in slime-forming material, or of high-lime content. New installations to treat high-lime ore are scheduled to go into operation at Uravan this fall.

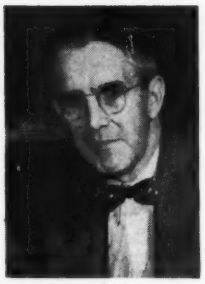
The economics of uranium mining present a confused picture but the present administration is working with the mining industry to improve the situation.

At the start of the Atomic Energy program uranium was obtained in large quantities, at low cost, from pre-mined accumulations in the Plateau and other parts of the world. As a result raw material prices were established at a very low figure. Another discouraging factor was the policy of the Manhattan District to hold American uranium ore in reserve under the ground and conceal its extent and availability for security reasons. Under this policy there was no reason for production incentive pricing, and emphasis was given to foreign production after the war.

Initial price of industry-purchased uranium ore approved by the government was $0.35 per pound for .20 percent uranium ore, which is less than 10 percent of present ore prices. The bonus for the initial 10,000 lb of uranium production has encouraged highgrading of known deposits, rather than the discovery of new deposits.

Most miners hope for a uniform price and full control of economic factors relating to uranium mining on a competitive basis.

The Atomic Energy Commission and Mining



By HENRY D. SMYTH
United States Atomic Energy Commission

ONLY ten years have passed since the first self-propagating nuclear chain reaction was achieved at Chicago on December 2, 1942. For the six years of its existence, the primary purpose of the Atomic Energy Commission has been to help build the military strength of this country. This is still its principal purpose.

Congress has authorized two major expansions in AEC facilities. Plants at Savannah River, S. C., and at Paducah, Ky., are the biggest items in the first of these expansions. The second, authorized in 1952, entails an entirely new plant at Portsmouth, Ohio, and enlargements of several older plants. Obviously, these new plants and the enlarged older ones will require an increasing supply of raw materials.

The original sources of uranium and radium were principally the Colorado Plateau and the Joachimsthal in Czechoslovakia. Even before the war, new mines in the Belgian Congo and northern Canada had outstripped both these sources. In the past five years considerable success has been achieved in finding new deposits, but there have been no bonanzas.

The Belgian Congo mines and Eldorado in Canada continue to be major suppliers. We have high hopes for the new mines in northern Saskatchewan and in Australia. Within a few months we will begin to get uranium as a by-product from the South African gold mines, and on a smaller scale by-product uranium from the phosphate industry.

What does the Atomic Energy Commission do with the uranium ore we buy? First of all, we refine it. The refined product is divided into two streams. One is converted into uranium hexafluoride and goes to the isotope separation plant at Oak Ridge. The other is converted into metallic uranium and goes to the plutonium plant at Hanford, Wash.

The Hanford plant consists of nuclear reactors using the natural mixture of U 235 and U 238. Fission occurs in the U 235 and the neutrons from that fission produce plutonium in the uranium 238. The energy released by the primary fission of U 235 is wasted at present. It is difficult to get energy out of these reactors because they have to be run at relatively low temperature.

The first problem to be solved in making use of the energy developed by a nuclear chain reactor is to build one that will operate at high temperatures. For this reason special expensive materials must be used either as coolants, or as structural elements of the reactor. For special purposes, such as the propulsion of a submarine, this is already worth while.

There are two ways in which costs may be brought down. One is to build a reactor using natural uranium fuel, producing power at a relatively high cost, but at the same time producing plutonium. Difference between the cost of power so produced and conventional coal-fired steam power would be more than made up by the value of the plutonium produced.

The second way is the power breeder. Ideally, a power breeder would start with natural uranium as a fuel. As the U 235 split up, it would furnish heat, but it would also produce plutonium. This plutonium would in turn undergo fission, producing more energy and more neutrons, etc., etc. This process would continue until all the uranium originally present had been consumed. In actual practice the reaction would be stopped before the fuel was consumed because the fission products act as impurities to absorb the neutrons and prevent propagation of a chain reaction. Probably the most important factor in the cost of operation of such a power plant would be the frequency and cost of chemically separating these impurities.

About a year and a half ago, it was felt that developments had come to the point where a serious study should be made of the possibility of building nuclear power stations on an economically competitive basis. Some of the four groups carrying out these studies feel convinced that they can make radical steps in technology and eventually reduce costs.

Now the AEC faces a whole series of political and sociological questions. We cannot split the atomic energy industry into two parts, one for military purposes, under government control, and the other for civilian purposes under private industry. There are several problems to be solved before private industry can enter the picture. None of these difficulties appear to be insuperable and they could be avoided by maintaining government monopoly and putting the government still more into the power business. There are many objections to this possibility.

Any estimate of possible demand for uranium for civilian power is a guess, depending on unsolved technical and economic problems. However, the use of uranium for power purposes will become economic before the need for uranium for military purposes begins to slack off. Therefore, I believe there is going to be a continued demand for uranium ore.

Nuclear Power

By HON. GEORGE W. MALONE
U. S. Senator from Nevada

IT is only ten years since man first initiated a self-sustaining chain reaction and controlled it. Radio-active substances hundreds of times more useful than radium or X-rays in cancer treatment have been developed, and leading industrialists are awakening to the great value of radiation in many other fields.

It may be that nuclear produced electric power within areas now served by low-cost hydro-electric and steam-electric power is several years away, but within the vast and isolated power-starved desert and mountain areas atomic powered electric generating plants are feasible.

It is estimated that electric energy can be produced for 1¼ cents per kilowatt hour using nuclear power. In the inter-mountain region around Eureka, Nev., particularly, diesel power costs three cents per KWH. If such a nuclear power plant is feasible in this area, then similar plants can be constructed anywhere under proper competitive conditions, and will be the answer to the mountain states 100-yr prayer for the development of their resources, including mining, irrigation, and industry.

The Atomic Energy Commission, fully alive to the possibilities of commercial power development, has intensively investigated this field for about two years. Four major power companies, allied with great chemical or industrial companies, have joined in these studies. In July of this year the AEC announced that at least one of these companies was ready to cooperate on the construction of a power reactor.

Dr. Lawrence Hafstad, Director of Reactor Development, AEC, visited Eureka, and at his suggestion a feasibility report was submitted on July 25, listing in detail the mines, ranches and reclaimable desert valley areas awaiting power. Supplemental information has since been supplied by a central Nevada committee to cover any possible power uses not treated in the previous report.

In addition to power loads enumerated in the report, several small electric utility companies within 75 miles of Eureka, now using diesel engines, would welcome interconnections with reactor power.

Eugene M. Zuckert, a member of the AEC, made the following statement on September 11: "The growing interest includes the practicality of atomic power for the opening up of underdeveloped areas both in this country and in other parts of the world. Scientists had thought of atomic power becoming practical 10 or 15 years hence. We suddenly find it seems close. . . . I will say we will have at least one and perhaps a few nuclear power plants producing electricity for industry or central station networks sooner."

Of course, there are problems to be solved, but none are unsurmountable and all can be speedily solved.

In time, private industry will take over in the atomic power field, but this cannot be anticipated just now. The government, through AEC, will build, control and operate all reactors.

Commercial nuclear power is feasible in the high-power-cost mountain and desert areas now. Every time a plant is built something new will be learned to reduce the cost of production. The time is opportune for the AEC to construct the first nuclear power pilot plant where power can be sold at a profit and simultaneously create profitable mining, irrigation, and industrial operations.

PROSPECTING AND EXPLORATION

Session Chairman

JOHN W. VANDERWILT

President

Colorado School of Mines

Airborne Exploration Methods

By F. W. HINRICHS

Geologist

Fairchild Aerial Surveys, Inc.

IN considering new developments and methods used in prospecting for mineral deposits, it is interesting to review the actual and potential contributions which aircraft may make. Although various exploration techniques are interrelated and overlap, the discussion of developments in normal surface prospecting by geophysical and geological approaches will be left to others.

Petroleum exploration, with its regional problems, has thoroughly exploited the airplane, which is, of course, the ideal means of covering large areas swiftly and economically. Occasional mining problems, upon analysis and reduction to essentials, will be found to be regional or semi-regional in nature; recognition of these larger scale problems is perhaps difficult, but when the decision to approach such a problem in a broad way is made, the use of the aircraft should be carefully considered.

Aerial photography, with the accompanying accurate maps which can be made therefrom, is a fairly well understood exploration approach; color photography may be useful when the problem is evaluated.

Geophysical methods, when examined from the viewpoint of adaptability to aerial use, fall into two main groups:

A. Those which measure an existing field of some nature; magnetic, gravitational, radiation.

B. Those in which energy is generated and measurements are made to determine what happens to the energy; seismic and electrical methods of various types.

1. Those requiring direct connection with the ground either to enable the energy to enter the ground or enable the precise definition of what happens to the energy; resistivity and potential methods.
2. Those not requiring either that the energy be introduced directly into the ground or that the measurement of resultant effects be made in contact with the ground; induction methods.

The limitation on any method, of course, is that it should be capable of yielding on the ground reproducible results which have some degree of correlation with either geology or mineral deposits.

It is easy to see why the airborne magnetometer is the most widely accepted and used—to the extent of far more than one million square miles to date. The advantages of speed, low cost and freedom from misleading surface effects are well known. Elevation is not as critical as it would be either in an airborne gravity survey, if that were possible, or in an airborne induction survey. The principles of magnetism are recognized, not too complex for understanding, and the ground approach has been used for generations. Therefore, the change in the *status quo* from ground to air has not been difficult. Direct and indirect approaches to ore deposits have been quite successful.

Airborne radiation methods are not as well known, nor has much been published on induction methods. Other methods, probably wave energy methods, must first prove themselves on the ground to have worthwhile penetration and to furnish acceptable varieties of information, and then must overcome the difficulties of providing adequate airborne energy source capable of overcoming the attenuation due to scattering, absorption, and the always vital physical rules which govern the return of reflected energy.

Geophysical Prospecting

By E. E. MAILLOT

Research Department

Phelps Dodge Corp.

GEOPHYSICAL methods now applicable to mining problems may be divided into two main classifications. The first group includes methods that utilize the measurement of a natural field or phenomena. These consist of Magnetic, Gravity, Self-Potential and Telluric current methods. The second group includes methods that utilize measurements on artificial or applied fields of some form of energy. These include the Resistivity, Electro Magnetic, Electric Transient, Induced Polarization and Seismic. There have been some noteworthy advances during the past five years in the artificial electric field methods and in gravity as applied to mining problems but we are still very much in the infant stage.

In the artificial field methods, Resistivity is probably most extensively employed. Other electric methods, name-

ly Induced Potential and Electro-Magnetic have also been used extensively when conditions are favorable for their application. Thus far the Seismic method has not been applied successfully to mining problems.

In the natural field group probably the one most extensively used is the Magnetic method which has been augmented considerably by the perfection of the airborne magnetometer. The Self-Potential method is valuable for reconnaissance and the Gravity method is quite useful under certain underground conditions. The Telluric current method is not particularly well suited to mining problems.

Geophysical methods are currently being applied to the following types of investigations:

(1) At operating properties either underground or on the surface.

(2) On undeveloped or only partially developed properties or prospects.

(3) In water exploration which is an important problem in the southwest mining areas.

Under interpretation of data it is generally conceded that the ultimate would be a direct mathematical interpretation of geophysical data with but little regard for geological conditions. We seriously doubt whether such will become possible in the foreseeable future. Improved field techniques and instrumentation have increased considerably interpretable working depths for the Resistivity method. A direct mathematical interpretation technique of this method has been sufficiently successful to encourage further research in this direction. In any event we definitely require a still greater working depth for all geophysical methods.

On, or in close proximity to operating properties, the electrical methods frequently suffer from interference by dc return circuits and ac surges. This is also true of the Magnetic method, which, in addition, also suffers from the presence of iron in the vicinity of operating properties. The use of these methods is either prohibitive in such localities or restricted to shutdown periods. The Gravity method, however, is not affected by such influences and has been quite useful underground in operating mines.

Before a geophysical survey is undertaken there must be some expectation of success and a careful study of many factors is required to decide whether a geophysical program should precede a direct prospecting campaign, such as by diamond drilling. Whenever possible geophysical work should begin where geological conditions are better known, rather than to proceed from a point where conditions are comparatively unknown. From the known conditions the survey can then proceed outward and hence extrapolate this information to outlying areas.

In ground water surveys the Resistivity technique is generally used. The two problems to be solved or considered are the depth to the water table and the area or areas of greatest permeability; the second factor being most important since it establishes the area which will yield the highest rate of pumping.

The Prospector—Still the Foot Soldier of Mineral Exploration

By MILES P. ROMNEY
Manager
Utah Mining Assn.

BROADLY speaking a prospector is anyone engaged in the search for valuable metals in the earth's crust. The "foot soldier" of prospecting is the man who searches for ore through manual means, who examines outcrops, mineralized areas and mines by physical means to determine their prospective value for mining. Geophysics, soil analysis, and special uses of aerial photography are specialized phases of prospecting usable in varying degrees either following or preceding the "foot soldier" prospector's search and examination. The old-time prospector, the part time or Sunday prospector, the field engineers and geologists have discovered most of the present producing mines and will most probably continue to do so for the foreseeable future.

Hampered by the mounting discouragement of increased costs, decreased availability of obviously potential mining property, unrealistic and increasingly heavy taxation of mining profits, interest in prospecting in recent years has waned sharply.

However, in spite of this trend there have been many significant developments in the past 10 years in new producing properties, rejuvenated mines and districts and expansion of existing mines and districts, to lend encouragement to prospecting activity.

It is vital to the mining industry and to the nation as a whole to improve the climate for prospecting, to stimulate the prospector by offering greater opportunities for success. An old axiom fits the case: "When the demand exists and the price is right, the material will be found."

The "Paley" report projects demands for metals greatly in excess of our ability to produce and suggests both improvement of the "climate" for the domestic industry and further support of foreign developments.

Dependence on foreign sources of supply is undesirable to any greater extent than absolutely necessary. Recent negotiations for Chilean copper, Bolivian tin, Liberian iron, are excellent examples of the tendency of foreign governments to capitalize on our need. Every effort made "at home" to forestall or decrease dependency is a step toward maintaining our standard of living, assuring our security and insuring long healthy life for our domestic mining industry.

How many small mineral showings would become interesting to small companies and to private investors if their risk investments should receive realistic incentive-designed tax treatment? How many prospectors would again "hit the brush"? How many deposits of our present industrial minerals and potential industrial minerals would be found? All are questions answerable only by establishing a favorable incentive climate for the prospector.

Our neighbors to the north and south both answered the questions realistically. Canada permits three years of income tax free operation for new mining operations. Mexico allows up to 50 percent reduction in income tax liability for a limited time for both new and rejuvenated operations.

If we really want to develop our potential supply of domestic mineral resources to their utmost limit, then we should take every opportunity to furnish incentive to our prospectors. How many idle mining properties would come into operation under a tax policy permitting rapid amortization, full expensing of exploration and development costs and proper depletion allowances? Most of us can name properties not economic now, but which could be operated profitably under such a proposed incentive program. How many small mineral showings would become interesting to small companies and to individual investors if their risk investments should receive such realistic, incentive designed tax treatment? The number now interested in prospecting would be increased many-fold, both as to their number and the vigor of their search.

The plan has worked in other countries and in other natural resources industries in our own country. Let's give our Foot Soldiers the opportunity to show what they can do on the right kind of rations.

NEW METALLURGICAL PROCESSES

Session Chairman
J. PAUL HARRISON
Manager
Colorado Dept., American Smelting & Refining Co.

Chemico Process for Metal Extraction

By MAJ. GEN. W. N. PORTER
President
Chemical Construction Corp.

CHEMICAL Construction Corp. has developed a series of new hydro-metallurgical techniques for extracting, separating and refining metals. These processes are not only simple improvements on conventional methods but are inherently much more economical.

Much of the basic research was done at CHEMICO's pilot plant at Linden, N. J., and some special phases at the Stamford, Conn., laboratories of American Cyanamid Co. Facilities of Sherritt Gordon's demonstration plant at Ottawa were also, by agreement, available for large scale investigation of engineering design.

Research began in 1945 and continues. In this period, three large plants have been contracted for and processes developed for clients who had special problems. Some of the basic ideas developed while working on metals have been extended to other fields.

CHEMICO became interested in this technique as a natural consequence of its work in ammonia synthesis and related gas technology.

Chemical Construction Corp.'s engineers realized that THE Sterling Process is a new method for smelting zinc techniques and "know-how" of the heavy chemical industry could be advantageously and profitably applied to the whole field of extracting, separating and refining metals.

Zinc Recovery by the Sterling Process

By W. M. PIERCE
Licensed Plant Engineer
New Jersey Zinc Co.

ores using heat generated by an electric arc to carry on the reduction. Covering patents have been allowed to the New Jersey Zinc Co. By the process, zinc metal, together with its accompanying values, and iron are produced. All of these elements except for a controlled amount of iron are almost completely eliminated from the slag. The process derives its name from the fact that initially it was directed to the smelting of the crude ore from the Sterling Hill mine of the New Jersey Zinc Co. After calcining, this ore assays 18-20 percent zinc and an equal amount of iron. It has since been used on high grade zinc concentrates from which substantial recovery of secondary values can be realized. The lead, cadmium, and some of the silver, are collected in the zinc metal, while copper, gold, and the remaining silver are concentrated in the pig iron.

In solving the problem of smelting zinc in an arc furnace, it was necessary to establish means of controlling the heat distribution so that very high elimination of values could be attained and a condensable zinc vapor produced. At the same time, a satisfactory furnace life was an economic requisite.

In the Sterling Process, the charge is carefully proportioned to contain the theoretically required amount of carbon for reduction of the zinc, lead, cadmium, and part of the iron. The heat is generated partly by resistance of the slag in the path of the current and partly by the open arcs between the electrodes and the slag bath. The heat of reduction is largely that radiated directly from the arcs to the charge banks which are fed through ports in the roof adjacent to the walls. The residue melts down and is tapped off as slag. The reduced iron forms a bath beneath the slag and is tapped from time to time.

Condensation of the zinc vapor, which is more dilute and more difficult to condense than the vapor from the retort processes, is successfully accomplished in patented splash type condensers which have been described previously in the literature. Approximately 75-80 percent of the zinc vapor is tapped as molten zinc.

With high grade concentrates, a zinc recovery of 95 percent is attained. Reference has already been made to the recovery of other metals present.

The furnace now in operation, a 3-electrode furnace 16 ft by 32 ft, has a capacity of about 35 tons of zinc a day, the power input being approximately 3000 kwh per ton of metal; and 6000 kva transformers provide ample electrical capacity for further developing the possibilities of the furnace. The first campaign of nine months was a successful one. A second campaign, now under way, after a shutdown for some changes indicated in the first run, is showing the further refinements hoped for.

Development of the Sterling Process has now reached the point where it has been demonstrated that the difficulties which heretofore have prevented the smelting of zinc in an electric arc furnace have been overcome, and commercial application of the process may be expected.

C. H. SHACK

J. V. BATTY

Concentration of Western Manganese Ores

By C. H. SHACK and J. VANCE BATTY

Metallurgists

U. S. Bureau of Mines Experimental Station, Salt Lake City

THE prospects of a ready market at a good price for domestically produced ferrograde manganese ore and concentrates and the liberalized specifications for acceptable material have created opportunities for the western producer. For those whose interest has been stimulated, this paper reviews the problems that challenge the producer of ferrograde products from the aspect of concentrating the low-grade ores.

Western manganese ores vary greatly in mineralogical and physical properties. The present known deposits are low grade, averaging less than 20 percent manganese content, and are predominantly oxide ores. Primary silicate and carbonate ores constitute less than 25 percent of the known occurrences probably because of lack of exploration.

The grade and mineralogical and physical nature of manganese ores determine the amenability of the ores to ore-dressing methods. In general, the higher the grade and the simpler the mineralogical association, the higher the recovery of acceptable grade concentrates. Rhodochrosite ores are usually easy to concentrate, oxide ores are more difficult, and ores containing chiefly rhodonite and complex manganese minerals are impossible to beneficiate to meet specifications with an acceptable recovery of the manganese. Some 300 western manganese ores have been tested in the laboratory and pilot plant by the Bureau of Mines. About half of these could be concentrated by one method or another to give a product meeting current specifications. This group comprised the higher grade and less complex types of ore and had an average assay of 25 percent Mn. Recovery of manganese ranged from 40 to 95 percent and averaged 70 percent. The ores, chiefly the low-grade, silicate, and complex types, contained an average of 13 percent Mn. None of these could be concentrated to specification grade with a reasonable recovery.

Of the various ore-dressing methods, flotation has proved the most applicable to western ores. This is due to the fact that most western ores require grinding to 65 mesh or finer for liberation. Cationic flotation of the gangue constituents is rarely effective even on high-grade ores. Selective flotation with fatty-acid collectors and various modifying reagents is applicable to most ores. A fuel-oil, fatty-acid emulsion has proved the most effective collector for beneficiating oxide ores with a dominantly siliceous gangue.

Gravity methods, such as sink-float, jigging, and tabling, can be employed to concentrate suitable ores. However, the soft and porous ores and those requiring fine grinding for liberation are not suitable for gravity concentration.

Except for concentrating relatively coarse, porous manganese minerals and separating iron and manganese oxides, magnetic methods of concentration have proved less effective than other ore-dressing processes. The method may be a valuable auxiliary process for upgrading gravity concentrates.

Despite improved mineral dressing technology, no physical method has proved highly successful for rejecting the phosphorus or oxide base metal content common in many western ores. In most ores, the lead, zinc, and phosphorus are either chemically combined with the manganese or so intimately associated that liberation cannot be obtained.

Sintering and nodulizing of ores and concentrates upgrades both the manganese and the nonvolatile impurities by driving off the oxygen, carbon dioxide, and water of crystallization. Objectionable amounts of lead and zinc can be volatilized provided the manganese concentrate is sufficiently low in siliceous impurities. If silica is the principal gangue impurity, the concentrate begins to fuse at a temperature below that needed for effective volatilization of the lead and zinc. To remove lead and zinc from siliceous concentrates, it is necessary to employ a chloridizing roast prior to sintering or nodulizing, or to keep the charge "dry" by using large amounts of coke.

Improved technology has solved some of the problems inherent in recovering manganese from western ores as a product suitable for industry. It now seems possible that domestic sources could supply a more substantial part of our manganese requirements, but the production costs would be above the price of imported ore.

ROCK BREAKING

Session Chairman

E. R. BORCHERDT

Chief Research Engineer

Anaconda Copper Mining Co.

Blast Hole Drilling at Tennessee Copper Co.

By EZELL FLOURNOY

Mining Engineer

Tennessee Copper Co.

BLAST hole stoping has been practiced in the Boyd Mine for several years and has proved an efficient, safe and economical stoping method. It has been found that a burden of four ft between slice rounds was the most economical, with a burden at the points of the holes of between seven to ten ft. Drilling is done with Joy HS15 machines using E size, two-foot change, drill rods and concave diamond bits. An average of 135 ft of hole is drilled per man shift. For blasting 1¼ by 12-in., high velocity dynamite is used, producing approximately 2.5 tons per foot of hole drilled.

Since the dynamite consumption in the secondary blasting is high, various ideas have been tried in an effort to reduce the large muck in the primary break. To this end experimental test drilling using 2⅛ in. carbide insert bits and a four-in. percussion drill has been under observation, both in the Boyd and Burra Mines.

The test drilling in the Boyd Mine indicates that the carbide bit has a place in the blast-hole drilling with a limitation in hole depth of about 60 ft. For the carbide insert bit to compete with the diamond bit in drilling efficiency the level interval and drift spacing should be altered.

In the siliceous ores of the Burra Mine test drilling indicates that the carbide bit is more efficient than the

diamond bit. The carbide bit "change out" is about 31 ft in the Burra siliceous ores which means that two bits are needed to drill a hole 50 to 60 ft deep.

Study of the results of the tests in both the Boyd and Burra Mines show that there is a place for the 2⅛ in. carbide insert bit where the diamond bit penetration is 75 ft or less per use, where excessive length of hole is not required and where a two-man crew is necessary.

In conclusion, it is felt that the carbide bit has a definite use in the blast hole drilling with limitations and reservations as to types of ore, hardness and length of holes.

W. H. McCORMICK

R. W. PERSONS

Trends in Hollow Drill Steel

By W. H. McCORMICK
Chief Metallurgist
Park Works
and
R. W. PERSONS
Hollow Drill Steel Sales Manager
Crucible Steel Co. of America

PRACTICALLY all drilling is being done today with some form of detachable bit or with steels having carbides inserted in the steel itself. This has brought about a trend, in progress for some time, toward smaller sizes of hollow drill steel and an increasing demand for alloy hollow drill steel. This trend is amply illustrated in production data for the past three years in particular. As this trend continues, new problems for the steel maker are introduced.

Careful inspection of the mechanical properties of alloy hollow drill steel rods, as well as carbon rods, shows the importance of elastic limit or yield strength and stress vs strain or modulus of elasticity. The latter is a measure of the "stiffness" and must be carefully considered. Decreasing the size of the rod (its cross section) reduces its stiffness. It is inadvisable to change, for example, from a 1¼-in. rd carbon rod to a ⅞-in. hex alloy rod unless less rigidity can be tolerated. The alloy rods have the same modulus of elasticity as the carbon rods.

Studies are being made to determine the effect of alloy composition on peening or mushrooming of rod ends. To date these studies indicate that resistance to peening is generally a function of the heat-treated hardness.

Studies have been made to determine the relative ability of various carbon and alloy steels to be hot upset. These studies point out the extreme importance of using the proper forging temperature. In these studies standard hollow drill rod fabricating furnaces and steel sharpeners are being used. Temperature or heating time only is varied, all other factors remaining constant.

In the continuing search for improved alloy hollow drill steel hot forging, resistance to peening, fatigue life, elastic limit or yield point and machining must be considered. The steel makers' problem also cannot be overlooked. He must be able to produce a uniform and smooth hole and surface at a reasonable cost.

Engineers who design parts which are highly stressed and where fatigue is a problem agree that surfaces of such parts should be under compression. This appears to be logical in a hollow drill rod. It can be accomplished on all of the existing hollow drill steels by selective hardening the entire surface of the rod; for example, by flame or induction hardening. It may also be accomplished by cold working such as in shot peening. One of the rapidly growing alloy drill rods, by virtue of a characteristic increase in hardness from center to surface, appears to satisfy this requirement either in the condition received from the mill or after treatment by the converter. Additional studies of this phenomenon are in progress.

An entirely new alloy is being studied which appears to be less sensitive to mechanical notch failure at high hardness. It is still in the experimental stage. Work is in progress on forging, machining and fatigue life to determine if it fills all the necessary requirements.

As this trend toward alloy hollow drill steel of smaller cross section continues, it becomes increasingly important to follow the forging and treating recommendations furnished by the steel maker. The noticeable improvement in equipment found throughout the mining industry makes possible the accurate and closely controlled forging and treating of these new steels which is essential if their maximum value is to be realized.

Alloy Hollow Drill Rod

By L. F. BOMBARDIERI
Chief Engineer
Iron King Mine
Shattuck-Denn Mining Corp.

THE results of test work and operating data taken at the Iron King Mine of the Shattuck-Denn Mining Corp. have convinced us of the superiority of alloy hollow drill steel over standard analysis straight carbon drill steel.

The tests on the drill steel were run concurrently with certain detachable bit tests and cover a period of five and one-half months, with end results as shown in the test data.

The alloy rods were made from Crucible Steel Co.'s Park A Alloy Hollow Drill Steel. New steel was used exclusively in the fabricating of both types of rods and the same number of rods of each type, length and section were entered at the beginning and used throughout the test. In compiling results, a badly bent rod was regarded as a broken or destroyed rod and eliminated.

Every effort was made to make conditions of the test identical as to ground drilled, nature of the operation, air pressure, type of bit used, type of air drill used, human factors, etc.

Based on the results of these tests, alloy rods drilled 6.75 times as much footage per rod destroyed as did the standard analysis straight carbon rods. In addition, we have found an increase of 93 tons per steel failure with alloy steel as compared to the previous 39 tons with carbon steel. Previously, 300 pieces of steel were reconditioned monthly; now only 185 pieces of alloy steel are reconditioned.

The initial cost of the nickel alloy steel is about 30 percent higher than carbon steel, but with 150 percent better results an over-all steel cost reduction of approximately 35 percent was obtained. For a period of six months this year the alloy steel cost has been approximately $0.028 per ton, as compared to $0.043 per ton for the carbon steel over a similar period in previous years.

I wish to acknowledge the help given by A. J. Zinkl, Assistant Superintendent of the Iron King Mine, in the preparation of this paper.

Trends in Hollow Drill Steel

By J. FRED JOHNSON
Manager of Operations
Western Mining Department
American Smelting & Refining Co.

THE trend toward use of smaller sizes of drill steel is simply the natural result of the smaller diameter drill holes made possible by drilling with tungsten-carbide and with one use or throwaway type of steel bits.

As applied to drill steel, a different effect of using smaller diameter bits was well illustrated in a recent letter from Honduras, where an operator stated he had not tried alloy steel drill rod because a 16-month supply of carbon steel he kept on hand in his isolated location had grown to a four-year supply on account of his changing from drilling with detachable steel bits to drilling with tungsten-carbide bits. The natural reluctance to changing of the whole drilling machine set-up at any property to the smaller machines dictated by smaller diameter holes, is another retardant to use of smaller equipment with a change from carbon steel to alloy steel.

However, perhaps the greatest deterrent to adoption of high alloy steel to replace carbon steel is the very critical fabricating, annealing, and tempering procedures necessary to eliminate "notches" and bring the steel back to its as-rolled ideal characteristics.

My practice and my recommendations are that an operator buy completely factory fabricated alloy drill steel to first determine with accuracy the actual advantages of high alloy drill steel over carbon steel, in reducing his cost of drilling. Roughly, there are equivalent savings to be made in either the adoption of smaller diameter bits or in the use of alloy steel.

The millennium will arrive in alloy steel when an alloy be found that will be fatigue resistant and that does not have the critical fabricating, annealing, and tempering requirements of present alloy steel.

Drilling Progress at Homestake

By CLARENCE N. KRAVIG
Mine Superintendent
Homestake Mining Co.
Paper presented by Joel K. Waterland, Homestake Mining Co.

DRILLING practices have changed so rapidly in the past few years that any conclusions must be considered as interim reports. With additional experience and data pouring in, drill manufacturers are making changes in drills and bits at a very rapid rate. Homestake is no exception. Findings to date pose many additional questions and the answers will require additional testing. In fact, testing is a permanent part of their research program.

Until a few years ago all primary drilling in stopes and drifts at Homestake was done with 3½-in. drifters; and in the raises 3⅛-in. stopers (120 lb) were used, with one miner operating the machine unassisted. All drill steel used for development and stoping was 1-in. Q.O. forged drill steel with ⅛-in. gauge changes. In 1939, the forged steel was changed to 1/16-in. gauge changes, increasing drilling speed considerably and reducing air and steel consumption.

Forged steel was then abandoned and replaced by one-use steel bits in combination with the same size rods. One-use bits cut drilling costs further by reducing expensive transportation, etc., charges against over 3000 pieces of forged drill rods daily. Average drilling speed in ore with both forged drill bits and one-use steel bits was about 10 to 12 in. per min. Chief disadvantage of one-use bits is the problem of knocking off the used ones. Breakage averages about five percent.

After five years of testing, tungsten carbide bits have been adopted in all drifting and raising and are being adopted in stopes as rapidly as the drifters can be replaced by lightweight hand-held drills and air legs. The change was not based on the cost per foot drilled (which has been higher) but because of greater production per man shift and therefore better cost per ton. Costs per foot drilled with 1⅜-in. tungsten carbide bits and ⅞-in. hex. drill rods are improving with experience. Recently Homestake started an 8 by 8-ft drift with lightweight hand-held drills and air legs combined with 1⅜-in. tungsten carbide bits; the same equipment used in stopes. Results to date are satisfactory, and this lightweight equipment may well replace drifters in the near future. This equipment permits a complete cycle of mucking, drilling, pipework, trackwork, and blasting in one 8-hr shift. Rate of advance is 8 ft per 8-hr shift. Experimenting with lightweight stopers and 1⅜-in. tungsten carbide bits is scheduled for the near future.

Homestake has recently changed from one-use steel bits in combination with 3½-in. drifters and 1-in. Q.O. drill rods to lightweight hand-held drills and pneumatic legs combined with ⅞-in. collared hex. drill rods and 1⅜-in. tungsten carbide bits. This has increased production materially. Total footage drilled in a shift has increased over 50 percent, and contract earnings have increased substantially with less physical effort. Air consumption is cut nearly 50 percent.

Results to date show substantial increases in production. Miners prefer new equipment since it materially increased their contract earnings with less physical effort on their part.

Further testing is in progress, however, and additional changes are probable.

Development and Use of Jumbos for Sill Advancement in Butte

By A. E. ADAMI, Jr.
Underground Research Engr.
Anaconda Copper Mining Co.

THE function of a jumbo is to advance headings more efficiently by unifying all necessary equipment on an easily set up, mobile carriage. Through the flexibility afforded by power-actuated booms, operator fatigue is reduced and a desired cross section, minimizing overbreak, is attained.

Proper hole positioning which can be effected easily by the jumbo operator reduces costs and drilling time. A longer round can be drilled as a result of the time saving.

The jumbo idea came into consideration for Butte operations in the early thirties. Early models, mostly locally produced, appeared from 1937 to 1943 and mounted one, two or four hand-cranked drifters. Their main advantages were the attainment of mobility and unification of equipment.

Results from these early models brought manufacturers

into the field. World War II interrupted their production but several models appeared in the first years following.

The need for independent positioning of each drill appeared on the initial jumbos and was accomplished by multiple booms on factory models.

In 1946 the first "automatic" jumbo was tried in Butte. Since that time five other types both hydraulic and air-operated have been purchased and placed in operation.

Improvements of the latest models over earlier types are (1) easy demountability for lowering underground, (2) better carriage balance for quicker tramming, (3) accessible controls and offset booms for flexible positioning of a more standardized round, (4) semi-automatic drill positioning, (5) strengthening and protection of vital parts for reduced maintenance and idle time.

Higher speed drills, reduced bit diameter with faster penetrating design and smaller alloy drill rods have reduced actual drilling time.

Today's jumbos represent the most effective means of developing sills with research and testing resulting in continual design changes to the end of greater efficiency.

Maintenance of Rock Drilling Equipment at the Copper Queen

By WM. P. CRAWFORD
General Superintendent
Copper Queen Branch
Phelps Dodge Corp.

THE maintenance of rock drilling equipment presents a mutual problem to the Mine operator and to the drill Manufacturer. Items required in a maintenance program include:

(1) Standardization on types and makes of drills.
(2) Limitation of permissible underground repairs.
(3) Determining whether worn equipment will be rebuilt or scrapped.
(4) Degree of precision required in repairs.
(5) Cooperation between the mine organization, the drill repair and the steel shops.
(6) Detailed records of drill repairs.

Standardizing on a model and make of rock drill in each class means a small parts inventory and better results from the underground force and from the drill repairman.

Machine repairs, outside the drill shop, are limited to changing water tubes and side rods on drifters and sinkers. No other parts are issued to underground force.

All drills sent to the shop are steam cleaned and disassembled. Parts are cleaned, checked; needed parts are replaced and the drills are reassembled. Parts showing evidence of incipient breakage are replaced.

Tolerances on repaired drills are kept close to those on new drills. Replacement drill parts are purchased from the manufacturers. Worn parts which may be built up once in the Copper Queen shops include; steel centralizers, sinker frontheads and worn cones on drifter shells. Chucks, chuck jaws and rifle bars are not repaired.

Worn stoper or sinker cylinders may be ground oversize or chrome plated. Drifter cylinders are usually scrapped when worn to oversize of plus 0.004 in. Unless the guides are good, drifter cylinders are not ground oversize. Past history shows that chrome plating worn drifter cylinders is not worth while. Worn out drills should be scrapped and not rebuilt.

Shop records are essential and should show a complete history of an individual drill.

A good steel conversion shop is a necessity. Poorly made drill steel results in high drill repair costs.

All new drills received at the Copper Queen Branch are torn down, checked and oversize parts rejected before the drill is placed in service.

Manufacturers can aid maintenance by keeping parts tolerances within narrow limits. Sloppy fits and oversize tolerances increase the repair cost and decrease drill performance. A plus tolerance of 1/32 in. in a chuck jaw will reduce the over-all footage of hole obtained from this jaw by 6000 ft. A drifter cylinder which is ground 1/1000 in. over the standard diameter of a new cylinder loses 25 percent of its effective life.

Progress in the Development of the Rock Drill Bit

By M. W. HAWKESWORTH
Sales Manager
Western Rock Bit Mfg. Co.

THE history of rock drilling has been a most interesting one. Until the close of the last century all rock drilling was accomplished by hand. It was not until the invention of the pneumatic rock drill that present drilling methods were made possible.

The first pneumatic rock drills were heavy and bulky. All drill steel was solid and large in cross section, so holes drilled were large in diameter. With the invention of the airdrill, far greater footage per man shift was possible. Year by year pneumatic rock drills have been improved. Hollow drill steel has been introduced; wet drilling established; pneumatic rotation perfected; and finally automatic feeds replaced the hand crank method.

In hand drilling days the chiesel type bit was used most successfully. The pneumatic rock drill brought the four-wing bit forged on the end of the drill rod. Improvements in the cross bit included forging the wings and cutting gauge in a perfect circle, enabling this type bit to drill further and faster.

Between the years 1918 and 1922, the first successful detachable drill bit was invented by the late Arthur L. Hawkesworth. This was a four-wing multiple use type, and connection between bit and drill rod was a double dove-tail joint. The detachable bit was used successfully in the early twenties and thirties. Manufacturing technique, heat treatment and resharpening of dull bits was improved. Later this bit was replaced by the threaded type because it was cheaper to fabricate drill steel with the threaded attachment.

In many cases today the threaded attachment has been abandoned in favor of slip-on connections with the one-use bit. Because of variations in rock formation and drilling practices, however, no one type of bit is suitable for every drilling condition.

There are bits designed with pilot construction consisting of two raised V-shaped wings. Two of the cross wings have a 105° cutting angle and slope away from the pilot. The other two wings have a cutting angle of 90° and are raised higher. The pilot and special wings chip the rock being drilled and under proper conditions can drill further. Other wing designs offer maximum gauge wear in abrasive rock formations.

The tungsten carbide bit is especially useful in drilling very hard rock formations where a steel bit cannot be used economically. A rule of thumb, sometimes followed, is to use tungsten carbide bits when drilling speed drops below 10-in. per min.

Today manufacturers of rock drilling equipment are making improvements to increase the efficiency of the drilling method. These improvements consist of stronger connections for detachable bits; lighter and more powerful rock drills and alloy drill steel to increase rod life.

The wide selection available poses quite a problem in the choosing of proper drilling equipment. Proper balance in rock drill bit, drill rod section and pneumatic rock drill coupled with sufficient air pressures are the prime considerations in balancing over-all equipment.

Operators Corner

Winter Checkpoints For Diesel Haulage Equipment

By EMIL D. PRIETO
The Euclid Road Machinery Co.

AFTER several months of "summertime" it is time once again to get ready for cold weather conditions. Whether "low temperature" operation means a frigid 20° below zero or a balmy 55° to you, it is once more time to prepare for operations at temperatures which are consistently lower than those prevailing for the past several months.

Now this may be an old story to most of us, but it doesn't hurt to go over basic fundamentals—especially when it may mean dollars and cents. Downtime is expensive and it may often be avoided by daily or periodic maintenance checks and by paying attention to cold weather "rules."

Check Electrical System

Without proper maintenance, the electrical system can be a real trouble spot. Consider the battery as a heart and the electrical lines as arteries carrying power to motors, lights, and important accessories. As in human beings, a bum "ticker" or hardening of the arteries can just as well knock a truck over. So, let's look at the "heart" or battery first.

If at all possible, do not allow the temperature of even a fully charged battery to fall below 0° F. At this temperature, a fully charged battery has only 40 percent of the power available that it would have at 80° F. When you couple this with the fact that an engine at 0° F needs 2½ times more power to start it than at 80° F, it is easy to understand that the warmer the battery and the engine —the easier it is going to start.

Keep battery terminals corrosion free. Corrosion on terminals causes an extra resistance which prevents the battery from getting full generator charging current. Clean the terminals with a solution of baking soda and water, using a wire brush. Make sure that none of the solution gets into the battery as it is highly injurious. After cleaning, apply a coating of vaseline to the terminals.

Check battery gravity and electrolyte levels often. It is important to remember that when adding water in freezing weather, the unit must be run for at least 30 minutes in order to thoroughly mix the water with the electrolyte.

Tighten all clamps and connections and check all wiring and cables and replace those that are frayed or damaged.

Cold weather starting may often create a tendency to abuse the starting motor. It is doubly important to remember that a cranking motor should not be run for intervals any longer than thirty seconds and should rest for two minute periods between starting attempts. Operation in excess of these recommendations may

cause the starting motor to overheat and possibly burn out.

Finally, make it a habit to frequently check the ammeter during the day in order to quickly detect any tendency for prolonged discharge.

Clean Air Lines

Much diesel powered haulage equipment use compressed air to actuate brakes and other controls. In order to assure that this air is fully available, careful attention must be given to properly draining tanks and lines of water condensated from the air. Cold weather will cause a more rapid condensation of the air. It should be a daily practice to blow out all air lines and tanks and let the water drain out by opening the drain cocks on the tanks.

Add Anti-Freeze

Engine coolant temperatures should be maintained between 160° F and 185° F for good engine performance. If an engine has maintained a temperature well within this range during Spring, Summer, and Fall, it is reasonable to assume that the thermostat is in working order. However, if the coolant temperature has been below 160° F during the warmer months, the thermostat should be removed and checked.

If operations are to be in freezing, or near freezing conditions, a permanent type anti-freeze coolant should be used. At this point it should be remembered that alcohol mixtures are not satisfactory for diesel engines since alcohol normally boils at 174° F, and this is within the 160° F to 185° F operating range for diesel engines. Beware of sudden cold snaps! Although weather conditions may normally be above freezing, there is always the possibility of a sudden drop.

Before adding a permanent type anti-freeze drain and flush the whole cooling system and check closely for leaks. Anti-freeze is commonly "thinner" than water and, therefore, has a tendency to quickly find leaks.

Pamper Engine

The effect of temperature on engine performance is extremely critical in cold weather. Give the cold engine a chance to warm up gradually so that the cold and thickened lubricating oil reestablishes its film between shafts and bearings and pistons and liners. By the same token, an engine that has been operating for a period of time and is hot, should be allowed to cool gradually before shutting down. A hot engine has a great deal of heat stored up in itself, and if it is shut off immediately, the heat cannot escape because lubricating oil and coolant circulation stop when the engine stops.

Do not let the engine idle for long period of time. In cold weather this is especially true because the engine is not up to its normal operating temperature when idling, and the result may be poor combustion, poor lubrication, gumming of rings, and clogged injectors.

Cold weather also requires the use of winter grade fuel oil, as well as lubricating oil and grease.

By properly conditioning equipment for winter service, a mine operator is in better position to make cold weather operations profitable operations

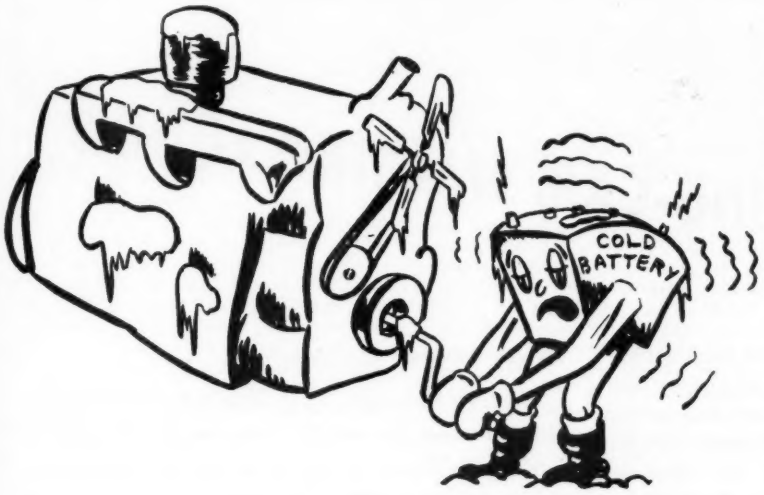
Change Oil and Grease

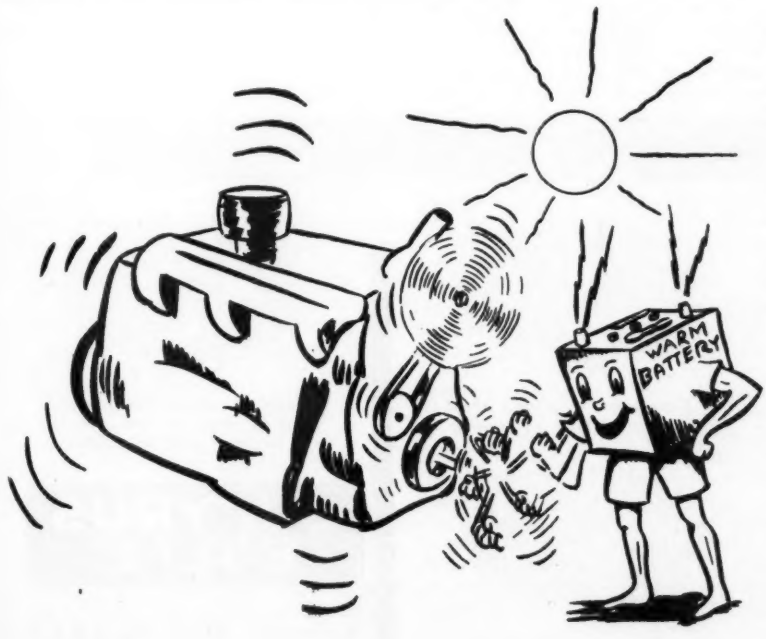
Follow manufacturers' recommendations on the use of "thinner" winter grade lubricating oils and greases. Chassis grease must also be of winter grade if operations are to be in arctic conditions.

Extremely cold weather will cause excessive condensation of moisture in crank cases, gear cases, and tanks; therefore, sumps should be drained more often and lubricants changed more often to remove the moisture before it can corrode metals or form harmful sludge.

The use of exhaust heated bodies for faster and easier winter dumping is becoming widespread. The principle, in short, is to circulate the engine exhaust gases through the bottom and front of the body before final exhaust.

During the warm weather months, it is common to "cut-off" this system and use a direct exhaust. Therefore, when preparing for cold weather there are several points that should be checked. First, make sure that the final exhaust ports in the body are clear. Second, all the flexible tubing and other piping is in good condition and free of kinks. Third, the body (both inside and out) should be free of holes, dents, and cracks. Dirt and rocks could work their way into the system. Last, make sure that the union between the exhaust outlet from the engine and the exhaust entry into the body is in good working order. Obstructions can cause back pressure on the engine and hinder performance. Leaks might render the system useless.





Follow Instructions

Cold weather, with its accompanying wet, sticky, and poor visibility conditions require that vehicle drivers pay more attention than ever to driver safety rules such as passing, stop signs, and courtesy.

Check windshield wipers and brakes before starting off—and be sure to build up proper air pressure!

Extra care must be taken to be sure that the vehicle is fully under control on curves and grades.

All gauges, accessories, such as heaters, and other devices should be in good working order.

The vehicle should be warmed up enough before starting the workday so that the hydraulic system is free working. Hoists and steering aids may not work properly and may even pop seals unless the hydraulic oil is warmed up.

The operator should review the use of winter starting aids such as air heaters and ether to make sure he understands what the proper procedure is. Improper use may cause severe damage to the engine, and may even be dangerous.

Bucyrus-Erie Leadership in Walking Draglines...

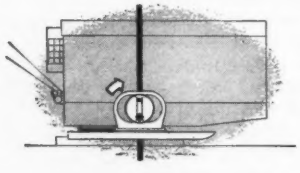
Exclusive ROLLING-CAM WALKING ACTION

One big reason why Bucyrus-Erie draglines are such smooth, steady workers is that they are smooth, steady *walkers.* They can step out in any direction . . . on loose sands, over swampy ground, along muddy river bottoms and the edges of banks . . . through weather that would stop crawler mounted machines.

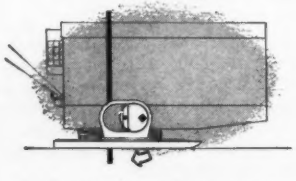
There's no jerking . . . no shocks to machinery, either, because the weight of the dragline is cushioned with almost unbelievable ease by Bucyrus-Erie's exclusive rolling-cam walking action.

100L52

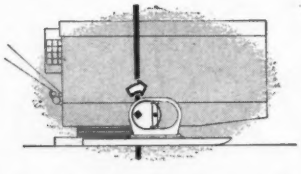
No other walking system is so smooth, so strong or so simple in design



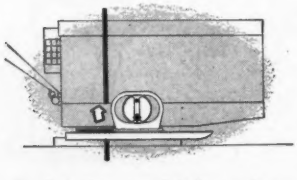
1. Working position. Shoes up — cams in center — guide roller pin at top.



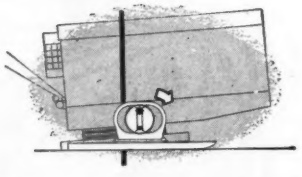
4. Base is lowered as cams continue to roll.



2. Cams rotate — advance shoes and place them on ground.



5. Rotation completed — return to original position.



3. Leading edge of base lifts and skids along as cam rolls to half-way point in rotation.

BUCYRUS ERIE

South Milwaukee Wisconsin

Wheels of GOVERNMENT

AMC

As Viewed by A. W. DICKINSON of the American Mining Congress

UNTIL after election day on November 4, all else in the national, international or other field of events pales before the all-absorbing attention to the outcome of the political campaigns. Added to the question of who will be the next President of the United States are the uncertainties of the campaign results for members of the Senate and the House. Will the Republicans control the Senate—will they control the House, or will the Democrats remain in power? Who will head up the important committees of the two Houses, and what new faces will appear on the Majority and Minority sides of such committees as Senate Finance, Banking and Currency, Labor, Interior and Insular Affairs; what of the House Committee on Ways and Means and the other important House committees?

Whatever the result of the election, the 83rd Congress will have to deal with amendments to the revenue laws, the Taft-Hartley Act, social security, minerals policies, public land laws, and more.

Taxation

The current feeling of all who are engaged in industrial enterprise was recently pointed up by Commerce Secretary Sawyer, when he told the Business Advisory Council of the Department of Commerce that the excess profits tax should be terminated on June 30, 1953. The Secretary also declared that both taxes and Government spending should be reduced.

The Secretary's views coincide closely with the tax declaration of the American Mining Congress at the Western Division meeting in September. (pp. 71)

Coal Wage

The new wage contract between the bituminous coal operators and the UMWA effective for a year from October 1, provides for an increase of $1.90 in the basic underground day wage scale, and a 10c a ton increase in the operators' contribution to the Welfare Fund. This increases the basic wage from $16.35 to $18.25 and increases the welfare payment from 30c to 40c a ton. The over-all production cost increase is indicated to be something less than 40c a ton.

Further features of the new working agreement include: (1) establishment of a new seniority system by classifications and by mines; (2) a provision prohibiting the leasing of lands by any signatory as a subterfuge for the purpose of avoiding the application of the agreement; (3) a provision limiting settlement of all disputes and claims which are not settled by agreement, to settlement "by the machinery provided in the 'settlement of Local and District disputes' section' and without recourse to the courts"; and (4) revision of the Welfare Fund provisions to provide that the Trustee designated by the UMWA shall be Chairman of the Trustees of the Fund and Chief Administrative Officer of the Fund.

The anthracite operators and UMWA on September 17 made an interim agreement, effective October 1, under which payments to the Welfare Fund are increased 20c a ton—from 30c to 50c. This agreement also provides that the Trustees of the Welfare Fund will furnish regular monthly statements of all collections from each signatory operator, to the Chairman of the Anthracite Wage Agreement Committee and the Union. Conferences are continuing on the new anthracite wage agreement.

The Wage Stabilization Board, following conferences with representatives of the bituminous operators and the UMWA, has not at this writing reached a decision as to whether the new pay increase is permissible under its regulations. The increase can't be paid until the Board gives its approval—neither can the Office of Price Stabilization lift coal price ceilings or grant a price increase until the WSB has approved the pay boost. Meanwhile, more and more mines are being laid idle as increasing numbers of miners remain at home awaiting Board action on their new wage rates.

★ ★ ★ ★ ★ ★ ★

Washington Highlights

CONGRESS: Campaigning.
TAX: Repeal excess profits tax?
COAL WAGE: Agreement reached.
COAL MINE INSPECTION: Wyoming first in joint inspections.

★ ★ ★ ★ ★ ★ ★

Coal Mine Inspection

A plan submitted by the State of Wyoming for State-Federal inspection of coal mines for prevention of major disasters has been approved by the United States Bureau of Mines. Announcement of the approval was made October 8 by Undersecretary of the Interior Vernon D. Northrup. Immediately preceding approval of the agreement, Governor Frank Barrett of Wyoming declared, "The coal mining laws of Wyoming, which were recently revised and brought up-to-date, are very complete; and we have a competent and adequate staff of inspectors and our safety record for many years past compares favorably with other States."

Under the agreement, provision for which is contained in the new Federal Coal Mine Safety Act, the State inspector of Wyoming or Deputy State inspectors and Federal coal mine inspectors will make joint inspections of all coal mines in the State subject to the provisions of the Act. In cases where the State inspectors fail to participate in such inspection, however, the Federal inspectors may inspect mines and issue notices of findings or orders.

The plan is to be effective for an indefinite period. However, the State may cancel the plan upon 10 days' notice. The Director of the Bureau of Mines may cancel the plan only after reasonable notice and an opportunity for a hearing by the State

(*Continued on page* 141)

"WE SAVE $9,000 A YEAR—AND HEAT MORE SPACE—BY BURNING COAL THE MODERN WAY!

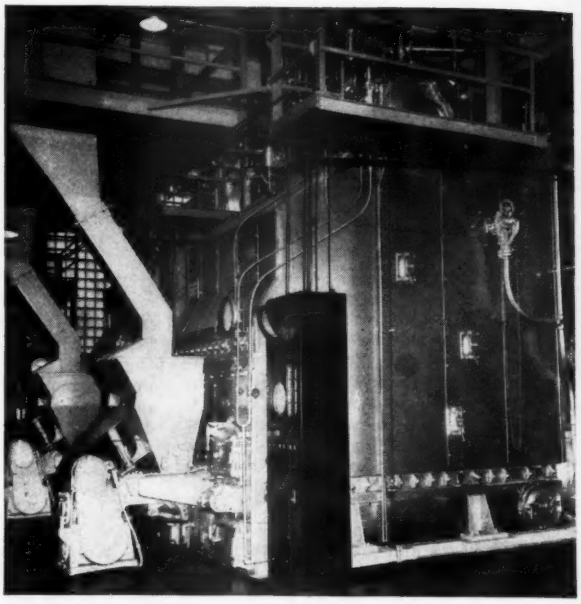
NEW COAL INSTALLATION SAVES US 31.9%—43¢—ON EVERY THOUSAND POUNDS OF STEAM!"

says Mr. Robert W. Paul,
Heating Engineer,
the University of Akron,
Akron, Ohio.

NO SMOKE CONDITION... NO DUST NUISANCE—

this plant is located in a residential neighborhood and operates well within the bounds of extremely tight smoke and dust regulations—thanks to burning and handling coal with up-to-date equipment!

This view shows Akron's two new stoker-fired boilers. The old equipment delivered a thousand pounds of steam at a cost of $1.35. Now Akron gets a thousand pounds of steam for only 92 cents, *cutting cost by nearly* ⅓! For about $26,000 a year, this new plant does the work that would have cost $35,000 with the old one.



If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest-cost fuel.

COAL resources in America are adequate for all needs—for hundreds of years to come.

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association, Washington, D. C.

Planning to modernize? Building a new plant? In either case an up-to-date coal installation can save you lots of money!

Labor costs are cut to a minimum with modern coal- and ash-handling systems . . . modern combustion equipment gives more steam per dollar—10 to 40% more power from every ton of coal!

A consulting engineer can show you how these savings really mount up—and mount up fast—when you burn *bituminous* coal in a modern plant designed to meet your *specific* needs.

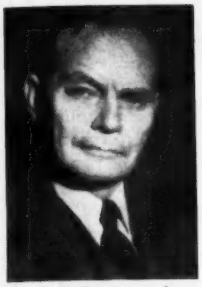
And coal's your best bet for the future, too. Of all fuels, coal alone has virtually unlimited reserves. And America's coal is mined by the most productive and efficient coal industry in the world. That's why coal offers greater price stability and more dependable supply than any other fuel!

FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

AMC Personals

Luther R. Branting, works manager of Alcoa Mining Company's Bauxite, Ark. operations, has retired after more than 32 years' active service with the company, it was announced by Lawrence Litchfield, Jr., Alcoa Mining Co., president in Pittsburgh. Branting was succeeded by **J. Thad Watters**, who began his Alcoa service as a draftsman in 1923 and who, since March of this year, has been assistant works manager at Bauxite.



Luther R. Branting

Since joining Alcoa, Branting has made a number of outstanding contributions to the aluminum mining industry. He was instrumental in organizing the Bauxite operations and, until retirement, held the title of works manager in charge of Alcoa's bauxite mining in Arkansas. Always keenly interested in conservation of natural resources, he has been a member of the Land Use Advisory Committee of the American Mining Congress.

J. Thad Watters

Watters is a civil engineering graduate of Georgia School of Technology in 1923 and has spent his entire business career with Alcoa. Prior to his appointment last March, he was general operating foreman at Bauxite since 1942.

Pittsburgh Consolidation Coal Co. has announced the appointment of **Jack E. Henderson** as traffic manager.

Henderson graduated from Syracuse University in 1936 and has been actively engaged in traffic and transportation for the past 15 years. He has been with Pittsburgh Consolidation or one of its associated companies since 1945, more recently as assistant traffic manager in the Cleveland office.

Sheldon P. Wimpfen was recently named Asst. Director, Atomic Energy Commission, Div. of Raw Materials for production from low grade and marginal sources.

James A. Barr, Jr., formerly with Armour & Co., has joined the staff of the division of raw materials of the Atomic Energy Commission and will be associated with S. P. Wimpfen in solving specific problems dealing with the production of raw materials from marginal sources.

Monte M. Soule, vice president and a director of the United Electric Coal Cos., retired from active participation in business on October 1. **John M. Morris** has succeeded Soule as vice-president in charge of sales.

United States Smelting Refining and Mining Co. has announced the promotion of five operating officials and engineers. **R. A. Pallanch**, mill superintendent at the Midvale Plant since 1934, has been advanced to consulting mill metallurgist. **C. A. Nelson**, smelter superintendent since 1939, advanced to general superintendent of the Midvale plant, and will continue to act as smelter superintendent. **Archie A. Nelson**, assistant smelter superintendent since 1948, was advanced to mill superintendent. **F. J. Marshall** was appointed assistant smelter superintendent and **Allan C. Vaughan**, engaged in research for the past four years, has become assistant director of the company's research laboratory.

Milton H. Fies, consulting mining engineer for Alabama Power Co. since 1937 and in charge of its coal mining operations since 1946, has been elected vice-president in charge of coal operations.

Fies, a native of Birmingham, is a mining engineering graduate of Columbia University and holds an honorary degree of Doctor of Science from the University of Alabama. He is consulting mining engineer for the U. S. Bureau of Mines and was vice-president in charge of operations for DeBardeleben Coal Corp. for 25 years.

On October 15, 1952, **Franklin Gray Pardee** became president of the Lake Superior Iron Ore Association. Pardee took the position formerly held by the late M. D. Harbaugh, who died in March. Prior to his new position, Pardee had held the position of Michigan state geologist since July, 1951.

The directors of Truax-Traer Coal Co., at a meeting held September 17, 1952, elected three new directors to the board.

H. C. Piper, Jr., was elected a director to succeed his father, **H. C. Piper, Sr.**, who was one of the original directors of the company and who is now relinquishing some of his varied business interests. **H. C. Livingston**, vice-president in charge of operations, and **H. R. Platt, Jr.**, newly elected vice-president and treasurer, were elected directors to fill existing vacancies.

Election of **Dr. Leslie G. Jenness** as vice-president in charge of research of Kennecott Copper Corp. was announced recently by Charles R. Cox, president. Dr. Jenness joined the Kennecott organization in 1950 and since then has supervised research activities.

Dr. Leslie G. Jenness

A graduate of New Hampshire University, he took his M.A. at the University of Maine and Ph.D. in Chemical Engineering at Columbia University.

E. T. Powell recently resigned as chief engineer of the Susquehanna Collieries Division of M. A. Hanna Coal Co. and has been appointed mining engineer for the Glen Alden Coal Co. Powell had been with the Susquehanna Collieries since 1924 and chief engineer since 1949.

Selection of **Dr. Joseph C. Rintelen, Jr.**, to head the Department of Mining and Metallurgy at Texas Western College, was recently announced by Dr. W. H. Elkins, president. Dr. Rintelen will succeed Professor John Fraser Graham, who has retired as chairman of the department after 27 years of service on the faculty.

Harry A. Crichton has been elected president of the Johnstown Coal & Coke Co. The position has been vacant since the death of Andrew B. Crichton, founder and president of the company since its organization in 1913. At the same time **C. N. Crichton** was elected vice-president and treasurer and **John N. Crichton** was elected vice-president in charge of operations.

Members of the Federal Mine Safety Board, recently appointed by President Truman, are: **Alex U. Miller**, retired Bureau of Mines official, chairman and representative of the public; **Joseph G. Scolari**, assistant general manager, Peabody Coal Co., representing the coal operators; and **Charles R. Ferguson**, acting safety director, UMW, representing the miners.

Philadelphia and Reading Coal & Iron Co. recently appointed **Howard Steidle** as executive engineer. Steidle was formerly associated with the Pittsburgh Consolidation Coal Co. and later with the foreign minerals region of the U. S. Bureau of Mines and Defense Minerals Administration.

O. N. Friendly, vice-president and consultant of the Park Utah Consolidated Mines Co., retired recently after 43 years of active work in the Park City district. Friendly will remain on the company's board of directors.

Ballard Wright is now superintendent at Crozer Coal & Land Co.'s operations at Elkhorn, W. Va.

The Colorado School of Mines has named **Lute J. Parkinson** as head of its mining department. He succeeds **Clifton W. Livingston**, who resigned to organize his own mining company.

Parkinson has had extensive experience in mine examination work and production operations in Europe, Africa and North and South America, followed by a long period of administrative positions. In 1950 he was awarded the School of Mines' highest honor with presentation of a distinguished achievement award.

Hollis G. Peacock rejoined the United States Smelting Refining & Mining Co. as geologist on September 1. Peacock is to succeed **L. F. Paddison**, who retires on March 31, 1953.

Matthew Cecchett became superintendent of Ocean Mine of the Pittsburgh Coal Co. Division of Pittsburgh Consolidation Coal Co. on October 1, 1952. He replaced **Richard McDougal**, who retired. Before his promotion Cecchett had served as assistant mine foreman at Ocean Mine.

Several personnel changes have been announced by the Woodward Iron Co. **Hewitt Smith**, formerly vice-president, mining, was elected to vice-president in charge of operations. **John W. Hager** was promoted from chief mining engineer to general superintendent of mining operations. **Thomas H. Kirk** was appointed chief mining engineer and was succeeded as superintendent of Mulga Mine by **Paul R. Ford**.

The Bituminous Coal Operators Association recently announced the appointment of **M. J. Ankeny** as safety director of the association. Ankeny has been associated with the Bureau of Mines since 1928 and held the position of chief of the Coal Mine Inspection Branch at the time of his recent change.

H. A. Doerner, metallurgist with the U. S. Bureau of Mines for many years, has accepted a position as metallurgist with American Chrome Co., Mouat, Mont.

1953 Coal Show

RAYMOND E. SALVATI, President, Island Creek Coal Co., has accepted the National Chairmanship of the Program Committee for the 1953 Coal Show, which will be held at the Public Auditorium, Cleveland, Ohio, May 11-14. All indications point to another record attendance of mining men and an equipment exposition surpassing even that of 1951.

The Program Committee consisting of operators and equipment manufacturers is now being organized and will meet in the near future to select subjects for the papers and speakers to present them. To aid in their selection, the committee will appreciate having suggestions from the industry for speakers and topics to be discussed at the Convention. These suggestions may be sent to the American Mining Congress, Ring Bldg., Washington 6, D. C.

The major purpose of the Convention will be to show how the industry is meeting the problem of holding production costs to their present level. Faced with the certainty of higher wage scales and the probability of higher costs for equipment and supplies, the industry must seek solutions to these problems through the combined efforts of all its branches. The 1953 Coal Show will bring every one to a common meeting ground.

Application forms for hotel space will be mailed out in November. They should be filled out and sent to the Convention Bureau at 511 Terminal Tower, Cleveland, Ohio, as soon as possible.

— *Obituaries* —

Dr. J. J. Rutledge, recently retired director of the Maryland Bureau of Mines, died in Baltimore at the age of 85. A native of Illinois, Dr. Rutledge spent his entire career in the coal industry. He was associated with several producing companies and with the U. S. Bureau of Mines for many years and with the Maryland Bureau until his retirement several months ago.

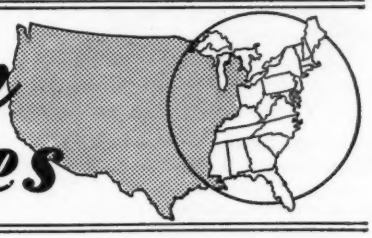
Joseph J. Walsh, deputy secretary of the Pennsylvania Department of Mines, died September 20 in a Harrisburg, Pa., hospital. He was 78 years old. Mr. Walsh was recognized as one of the country's outstanding mine safety authorities. His employment in this type of work began in 1905 with his appointment as coal mine inspector in Luzerne County, Pa. He served as secretary of mines in the first administration of Governor Pinchot. In recent years, as deputy secretary, he had jurisdiction over the anthracite industry.

During his career, he was cited for outstanding leadership in the safety movement in Pennsylvania, and in 1950 he received a certificate of honor from the Holmes Safety Association.

On July 23 **Thomas H. Clagett**, vice-president of the Pocahontas Land Corp., Bluefield, W. Va., died at the age of 76. Mr. Clagett was born in Berryville, Va. He received a degree from Lehigh University in 1897 and worked at various engineering jobs until 1905, when he joined the Pocahontas Coal & Coke Co. (now Pocahontas Land Corp.) as assistant engineer. He was named chief engineer of the company in 1937 and general manager in 1945. At one time he served on the state registration board for professional engineers.

NEWS and VIEWS

Eastern States



Pursglove Mine Closed

Pursglove No. 8 mine of the Christopher Coal Co., a subsidiary unit of the Pittsburgh Consolidation Coal Co., has been closed down, idling 230 men.

Charles B. Nailler, president of the company, blamed rising operating costs and the unstable coal market for the shutdown. The closedown is permanent, according to Nailler, who added that the company is unable to find other work for the miners who were laid off.

In 1951 the Pursglove mine produced about 563,000 tons of coal, most of which was shipped to manufacturers and utilities in the East.

Broaden Workers' Skills

A 16-page, illustrated booklet containing ideas and suggestions for broadening the skills of the Nation's work force has been published by the Bureau of Apprenticeship of the U. S. Department of Labor.

Titled, "Your Skill Improvement Program," the booklet emphasizes the importance of developing training programs to meet specific needs, sets forth ideas and suggestions for the organization and operation of skill improvement programs, and provides a check list to enable an employer to make a spot evaluation of his current training position.

Copies of this booklet may be obtained from the Publications Branch, Bureau of Apprenticeship, U. S. Department of Labor, Washington 25, D. C.

Mark 600 Millionth Ton of Coal

More than 600,000,000 tons of coal have been produced in the State of Virginia in the last century and a half. The 600 millionth ton was turned out on August 20 according to Dr. W. L. Slifer, chief of statistics and research at the Bituminous Coal Institute. This averages about 4,000,000 tons per year, but production didn't reach the 1,000,000 ton per year rate until 1888.

Last year's 20,410,000 ton output came from 327 mines and required a working force of 18,000.

While the first commercial coal mine in the nation was near Richmond, except for 113,000 tons mined in Montgomery County in 1951, all of last year's production came from the southwest Virginia field, a strip along the West Virginia and Kentucky borders comprising Buchanan, Wise, Dickinson, Tazewell, Lee and Russell Counties. It is estimated that there are 10 billion tons of recoverable coal left. This should last about 500 years.

Purchase Coal Mine

The Blubaker Coal Co. at Spangler, Pa., has been purchased by the Barnes & Tucker Co., Barnesboro, Pa. Barnes & Tucker Co. plans to maintain the Blubaker mine.

Mine Georgia Mica

Due to the shortage of high-grade mica, three mines were opened recently in Pickens County, Ga. Two of the mines are located in the Bethany section on property owned by Clyde Carney, while the third is situated on property of S. J. Lawson in the Dug Road District.

Open New Offices

On October 1, 1952 The Pocahontas Fuel Co. opened new offices on the 48th floor of the Chanin Building in New York City, and at Pocahontas, Va.

The accounting, financial and president's offices will be located in the company's new office building in Pocahontas. The general sales and export departments will remain in New York City at the Chanin Building address.

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Annual Conference of the Coal Division

William Penn Hotel, Pittsburgh, Pa., Thursday, November 20, 1952

A cordial invitation is extended to all coal operators and manufacturers interested in the improvement of coal mining to attend the 1952 Coal Division Conference at the William Penn Hotel in Pittsburgh, November 20. The conference will be for one day only, a morning session starting at 9:30 A. M., a business luncheon and an afternoon session, concluding about 5 P. M.

This meeting will be an open forum where the committees will present their reports for discussion. Copies of each report, in preliminary form, will be available. Comments and suggestions for any further studies of service to the industry are invited.

Eight committees will report as follows:

Committee on Roof Action—Roof Bolt Testing—Methods of Roof Support for Continuous and Conventional Mining.

Committee on Mine Lighting—Better Illumination Underground.

Committee on Haulage Roads—Standards for Heavy Rail Turnouts—Automatic Enforcement of Main Line Block Signals—Mine Car Capacity.

Committee on Mine Ventilation—Sealing or Ventilating Mined Areas—Sources and Prevention of Airborne Dust.

Committee on Conveyor Mining—Methods of Belt Loading—Belt Fire Prevention—Man Trips and Supply Handling for Belt Systems.

Committee on Mechanical Loading—Uniform Machine Controls—Auxiliary Operations for Continuous Mining—Shuttle Car Roadways.

Committee on Surface Preparation—Preparation Problems of Full Seam Mining—Preparation Problems of Continuous Mining—Freeze Prevention for Winter Shipment—Stream Pollution.

Committee on Underground Power—Cable Insulation—High Voltage Mine Power Cables—Reversed Polarity—Mining Machine Motor Ratings.

Study Anthracite Derivatives

Edward G. Fox, president of The Philadelphia and Reading Coal and Iron Co., has announced the establishment of a Mineral Industries Research Grant at Pennsylvania State College for study of the manufacture of carbon black and activated carbon from anthracite.

The principal objective of the study is manufacture of these known derivatives of anthracite under processes that will be competitive. Carbon black, for example, with many industrial applications especially in the synthetic rubber industry, is processed commercially today almost exclusively from natural gas. Activated carbon, on the other hand, has a limited industrial application largely because of high cost processes.

Made as one phase in a long range experimental and research program the company is sponsoring, the grant's aim is to develop and ultimately conserve anthracite by increasing the useful knowledge of its chemical applications. This grant at the Pennsylvania State College is in addition to a fellowship established at the Mellon Institute in Pittsburgh, the purpose of which is to investigate problems in connection with anthracite both as a fuel and as a source of chemicals.

Work at Pennsylvania State College will be carried on under the direction of Dr. A. W. Gauger, director of the Mineral Industries Experiment Station.

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Cutaway view of a typical cell used in batteries for mine haulage. High-strength steel construction is used in all cells.

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Virginia Manganese Mine

A 10-tpd manganese mining operation has been started in southwestern Virginia at Bland, and another of similar size is soon to begin production. Already in operation is the Bland Mining and Manganese Co., owned by Lester Church of Bluefield. He is installing a tipple and expects to increase output soon. Other operations are planned in the vicinity.

U. K. Coal Figures Up

Britain's coal output, man power and exports are rising. Recent production has hit highs around weekly totals of nearly 4,500,000 tons. Coal stocks are now more than 1,000,000 tons over the 17,000,000-ton safety level.

Britain's ability to export more coal is increasing as the year's production figures mount. It has just been announced, for instance, that the U. K. has almost doubled her deliveries of coal to Denmark, an old customer, sending 2,600,000 tons so far this year, compared with a total of 1,500,000 tons last year. Increased British imports have enabled Denmark to save dollars by reducing coal imports from the United States.

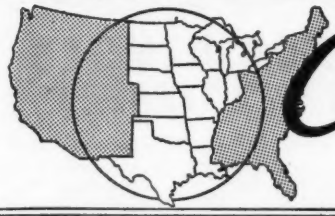
Improve Dock Facilities

Ore unloading facilities of the Canton Railroad in the harbor area of Baltimore, Md., are being expanded and modernized to speed up the transfer of incoming ore from ships to railroad cars.

The plant when completed will have a maximum rated capacity of 3000 tph, about double the present tonnage. It will be equipped with a conveyor system which can speed the ore from ship to shore at the rate of 50 cars (60 tons to a car) an hour. The actual weighing capacity at the track bin can be increased beyond this rate in emergencies.

The expansion program was undertaken in anticipation of increased imports of iron, manganese, chrome and other ores coming in from new developments in Labrador, Venezuela, Brazil and Liberia, and at the same time to handle larger imports from older producing sources in Sweden, Yugoslavia, Turkey, Africa and the Far East.

The conveyor system, designed and installed by Robins Engineers Division of Hewitt-Robins Incorporated, features two 48-in. wide belt conveyors totalling more than 1600 ft in length. The main belt running along the docks will be fed for the time being by two ship unloading cranes. Each one is designed to handle 1000 tons an hour. A third ship unloading crane of at least 1000 tons capacity is scheduled to be placed in operation in the second quarter of 1953.



Central States

Dedicate Coal Mine

On September 19, the Morgan Coal Co.'s new strip mine near Edwards, Ill., was dedicated in a program which saw 170 retail coal merchants, business and industry leaders in attendance. Called the Morgan-Peoria mine, the new operation is in the Illinois No. 6 vein and is fully mechanized. Capacity of the plant is 1200 tpd and the mine has a life expectancy of nearly 15 years.

Open New Sulphur Plant

A plant designed to extract sulphur from natural gas has been put into operation by the Phillips Chemical Co. in west Texas.

The plant, located in Crane County, Texas, is designed to produce 100,000 lb of sulphur per day. Sulphur from the plant is not to be solidified, but will be trucked in a molten state to a railroad spur, and loaded into tank cars for delivery to its final destination.

Wentworth Mill Burns

The Navy Bean mill of the Consolidated Mines Co., located about three miles west of Wentworth, Mo., was destroyed by fire on September 24. The mill had been shut down for a week while a new 500-ton hopper was being built.

The Navy Bean mill was originally constructed by the Eagle-Picher Mining & Smelting Co. The Consolidated Mines Co. placed it in operation last January after remodeling and modernizing it. It served as a custom mill as well as for milling company production.

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Plan New Mine

G. C. Wharton of Wise, Va., has purchased the mineral rights on a large tract of coal land north of Chattanooga, Tenn. The present plans call for establishment of two mines in the area. A large percentage of the output is scheduled to go to the Tennessee Valley Authority for use at its steam plants.

Coal Mine Reopens

Shut down three years ago, the Valier coal mine in southern Illinois is now back in operation under new ownership. The Old Ben Coal Corp., the new owner, has installed new equipment including a washing plant.

To Build Acid Plant

The Eagle-Picher Co. will soon start construction of a $4,000,000 zinc roasting and sulphuric acid plant at Galena, Kans., scheduled for completion during the early part of 1954. The company has been granted a certificate of necessity by the Defense Production Administration approving accelerated depreciation over a five-year period on a substantial part of the cost of the project.

About 240 tons per day of sulphuric acid will be produced at the new plant. The major portion of the plant's output has been sold under long-term contract to the Missouri Farmers Association which will construct a phosphoric acid and fertilizer plant near the Eagle-Picher plant.

The plant location at Galena, Kans., is a strategic one because sulphuric acid production is low in that district as well as in the Mid-West generally. At the same time, demand for fertilizer in the Tri-State district and adjacent areas has increased substantially in recent years and this expansion is expected to continue at a rapid rate. The Missouri Farmers Association, with an assured source of sulphuric acid from Eagle-Picher, considers it advantageous to increase its production of fertilizer in order to take care of the increasing demands of farmers for high quality fertilizers. The United States Government is encouraging such projects as it desires to see fertilizer production expanded in order that food supplies may keep pace with population growth.

Mine Uranium in South Dakota

Carnotite ore is now being mined commercially in the Black Hills area of South Dakota. The Atomic Energy Commission has not disclosed the size of the deposits, but confirmed the fact that they are a part of those discovered last year in Craven Canyon, Fall River County, in the southwestern corner of South Dakota.

From the limited information that the AEC has made public, the following developments in uranium mining in South Dakota are noted: (1) The discoveries in Craven Canyon area are being given "further detailed investigation" by the AEC and by several mining companies; (2) both the U. S. Bureau of Mines and the U. S. Geological Survey have investigators in the area; and (3) several companies are already mining sufficient quantities to make shipments to the processing mill operated by the United States Vanadium Co. at Rifle, Colo.

An AEC spokesman has said that most of the mining in the Black Hills area is being done by small operators, and that the opening of an ore-buying station should stimulate further mining. Carnotite was first discovered in Craven Canyon, north of Edgemont in June, 1951 by Jerry G. Brennan, Rapid City attorney and staff member at South Dakota School of Mines.

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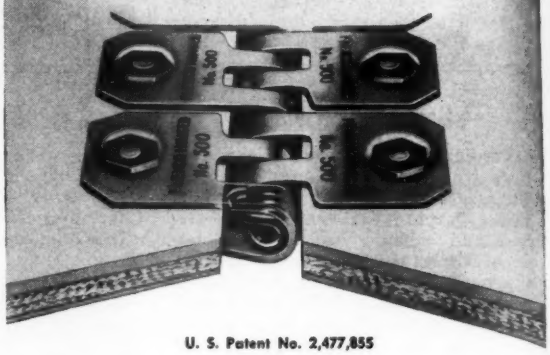

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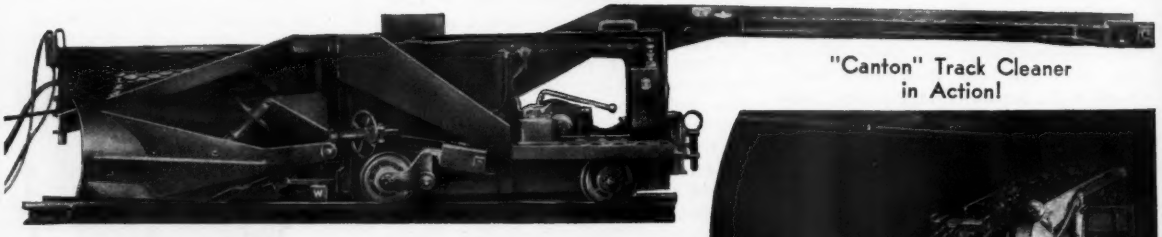

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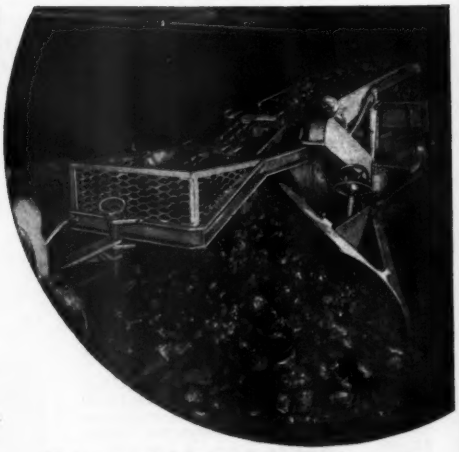

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Floating Sulphur Plant

Freeport Sulphur Co.'s new mine at Bay Ste. Elaine, La., is one step closer to completion. The surface plant has been anchored in position at the mine after a 65-mile journey from its construction site.

The sulphur deposit is located in the midst of the marshy bayou country which made it impossible to build the plant in the common way. Instead, it was built on barges and floated to its final location.

Prospect Southern Africa

The United States and Portugal are joining hands to conduct a large combined aerial and ground search for new mineral deposits in Portugal's two largest African colonies, Angola and Mozambique, according to a Mutual Security Agency announcement. The undertaking is expected to take 2½ years to complete, and cost the equivalent of nearly $2,000,000, which is to be shared by the United States and Portugal.

Portuguese government officials have concluded contracts with two private American firms, the E. J. Longyear Co. of Minneapolis, Minn., and Aero Service Corp. of Philadelphia, Pa., to undertake the geological and aerial surveys respectively. Ground and aerial surveys are expected to begin some time this fall.

The largest technical assistance project yet undertaken by MSA or its predecessor, the Economic Cooperation Administration, the survey will cover more than 62,000 square miles—an area about the size of New York, Massachusetts and Maryland combined.

Recover Uranium at Joliet

The first commercial unit for the recovery of uranium from phosphate rock has begun operation as a part of the plant of the Blockson Chemical Co. near Joliet, Ill., the U. S. Atomic Energy Commission has announced.

Research, engineering and construction of the unit were accomplished by the Blockson Chemical Co., which has a contract to supply the recovered uranium to the AEC.

Uranium occurs as a very minor component of the extensive phosphate deposits of Florida and several western states. Studies sponsored by the AEC have established the feasibility of recovering these small quantities of uranium as part of the process of manufacturing sodium phosphate chemicals and concentrated commercial fertilizers.

The uranium recovery facilities will be operated in conjunction with the Blockson Co.'s existing plant for the production of phosphate chemicals near Joliet. Phosphate rock from Florida is used in the plant.

Several other processors of phosphate rock have conducted research and pilot plant studies in the field of uranium recovery, and three companies are building full-scale recovery units. The International Minerals and Chemical Corp. and the Virginia-Carolina Chemical Corp. are incorporating uranium recovery units into plants now under construction near Mulberry, Fla., and the Texas City Chemicals, Inc., is building a recovery unit at Texas City, Tex.

Progressive Mine Workers Settle

On October 1 the Progressive Mine Workers signed a new wage agreement with the Coal Producers Association of Illinois. The new agreement provides for a daily pay increase of $1.90 and welfare fund contributions to be increased by 10 cents a ton to 40 cents per ton. The increases equal those negotiated by the United Mine

Engineer Selection

(*Continued from page* 52)

work in industry for three months, this program to be continued throughout the last four years of the five-year program. Island Creek has joined with VPI in indicating that it will establish positions which will be filled by these young under-graduates, and management feels that the program is superior to the usual plan of engineering education for work in coal mining because it provides for practical work experience during the time that the men are studying theory and handling their regular classroom work. It has all the advantages of providing summer work for students and in addition, enables the cooperating employer better to schedule the work of these young men because they are coming in throughout the year and only half as many jobs have to be provided for the same number of students.

The company plan is to set up about six jobs which will be filled at all times by participating engineering students. Each job will be filled the first three months by man "A" and then the second three months by man "B"; and then man "A" will be back again to take on where his buddy left off.

It is the hope that other mining engineering schools will adopt a similar cooperative engineering program. In the meantime, however, there is no intention of limiting the selection of undergraduates from any one institution. Island Creek will continue to cooperate with other engineering schools and to provide summer work for under-graduates to the fullest extent possible.

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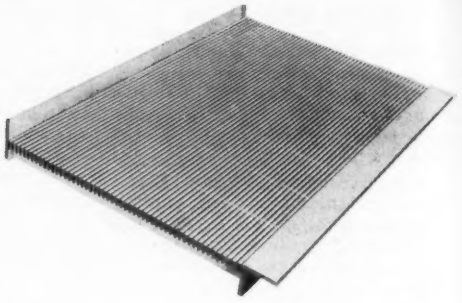
TRADEMARK REGISTERED

New types of screens for ore processing



For more efficient drainage, wet screening and heavy media recovery operations, Hendrick has developed two new types of heavy-duty Wedge-Slot Screens.

The profile bars (C-12 and CH-12) for these screens have their head flanges so designed that uniform width of slot opening is maintained until the entire head of the bar is worn down. Preparation plants in the iron range using these types of profile report that the screens have been used for a full season of continuous processing without requiring any maintenance or repair.

Both types are of similar design, but CH-12 has an extra large head flange to provide maximum resistance to abrasion on jobs with especially heavy loads of abrasive material.

If you will let us know what performance you are getting from your present equipment, we shall be glad to suggest how Wedge-Slot Screens might be utilized to advantage to increase production and minimize down time.

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Manufacturing Company

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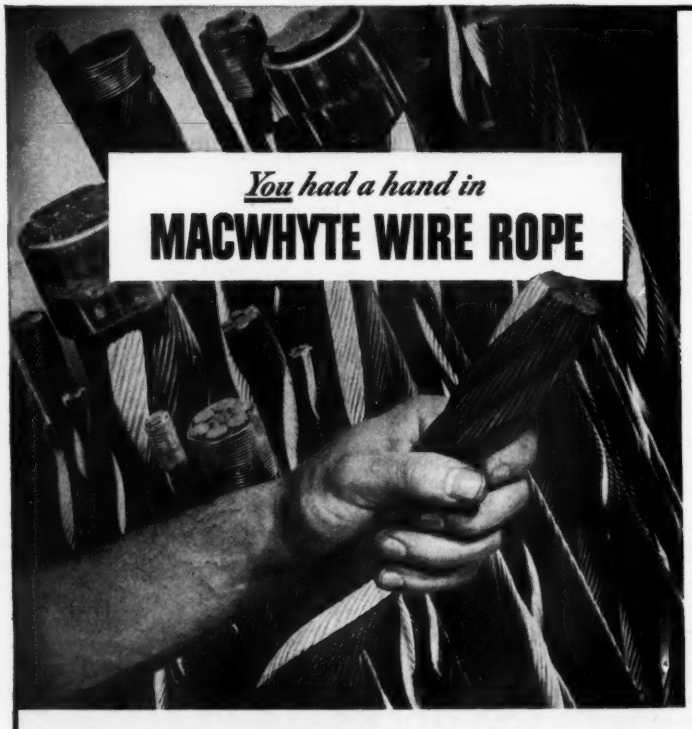
Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids



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THE EXPERIENCE OF hundreds of users — like yourself —goes into the making of Macwhyte Wire Rope. Over the years, their needs and yours have been studied by our engineers to produce the best wire rope for every type of mining equipment.

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You get the correct wire rope for your equipment when you buy Macwhyte

1020

Western States

Combined Metals Builds

Combined Metals Reduction Co. and its subsidiary, Pioche Manganese Co., are rushing completion of manganese processing facilities in Nevada. Capacity of the Caselton concentrator at Pioche, Nev., is being increased from 1100 tons a day to 1900 tons and the Caselton mine production raised from 700 to 1600 tons a day. New milling facilities include units for production of iron and manganese concentrates.

At Caselton, Nev., Pioche Manganese is completing a new plant to treat manganese concentrates. Equipment includes a rotary kiln 175 ft long and nine ft in diameter for nodulizing flotation concentrates.

Development of these properties has been in progress for about a year. Manganese nodules turned out by the Caselton plant will be shipped by rail to Henderson for reduction to ferro manganese in the Pioche Manganese electric furnace plant, now under construction.

Form Anaconda Aluminum Co.

Cornelius F. Kelly, chairman of the board of Anaconda Copper Mining Co., has announced the completion of the organization of its subsidiary, Anaconda Aluminum Co. (formerly Harvey Machine Co., Inc. of Montana). Francis O. Case, who is a vice-president of Anaconda Copper Mining Co., has been elected president of Anaconda Aluminum Co.

The aluminum reduction plant will be built near Columbia Falls, at the base of Teakettle Mountain, in Flathead County, Mont. Two pot lines together with accessory buildings and equipment, capable of producing 50,000 tons of aluminum annually, will be installed.

Construction preliminaries on the $45,000,000 project were begun soon after the announcement on September 3 that the Anaconda interests had completed arrangements to obtain alumina for the operation from Reynolds Metals Co. The project will be financed by the Anaconda Co.

At present, bulldozers are working in the area; the Great Northern Railway is laying a spur to the plant site; a temporary power line is being installed; soil borings are being taken for foundation information, and engineering work is in progress. The plant is scheduled for completion early in 1954, and will start producing aluminum shortly thereafter. Power for pot-lines will be supplied from the nearby Hungry Horse Dam through the Bonneville Power Administration.

Mining School Grows

In September the Colorado School of Mines, Golden, Colo., opened the doors to its new million and a quarter dollar chemistry building to train young mineral engineers from all over the world.

A new million and a half dollar petroleum building is expected to be completed for September 1953. A full-sized pumping rig is being built into it, rising 50 ft from the basement to the top of the fourth story. A 10-in. well, driven 100 ft into the ground under the basement, will aid in running tests on various types of deep well pumps and gas lifts.

Reopen Lab in Alaska

U. S. Geological Survey has reopened its uranium testing laboratory near Fairbanks, Alaska, to aid prospectors searching for deposits of atomic materials. Several field parties will be sent into Alaska to make reconnaissance studies of uranium deposits and to determine the extent of high grade uranium ore there. In addition to the laboratory, field offices elsewhere in Alaska have been equipped with Geiger counters to assist in the location of new uranium deposits.

Close Arizona Lead Mine

The St. Anthony Mining and Development Co., Ltd., Tiger, Ariz., has notified its employes that mine operations will be suspended about November 1. According to J. A. Richards, manager, the present depressed metal market for lead and zinc, coupled with the fact that excessive water has been encountered at the 1125-ft level, is responsible for the decision to cease operations. The shutdown will affect about 190 miners presently employed by the company.

St. Anthony's property was staked originally as a gold claim—back in the 1880's. It became a lead-zinc producer in the mid-1930's. In 1951 the company was the leading producer of lead in Arizona and ranked seventh in zinc production.

Pick a winning Card!

Every mine car built by *Card* is engineered to the mine conditions under which it will be used. You can pick the exact *Card* car to do the best job of cutting your ton-mile costs.

C.S. Card Iron Works Co.

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DENVER, COLORADO

Reopen Mouat Mine

American Chrome Co., subsidiary of the Goldfield Consolidated Mines Co., of Nevada has agreed to equip and operate the Mouat chromite mines in Montana for production of chrome ore for the Defense Materials Procurement Agency. The agency has contracted with the company to purchase 900,000 tons of chrome concentrates at $34.97 per ton over an eight-year period, provided concentrates contain a minimum of 38 percent chromic oxide.

DMPA will provide $2,825,000 for rehabilitation, equipment and other mine costs, and Goldfield Consolidated will furnish $1,000,000 as working capital. The proposed plant would treat 1000 tons of ore daily and turn out 370 tons of chrome concentrates. The mines have been idle since 1943 when they were operated for the government by the Anaconda Copper Mining Co. A mill capable of treating 200 tons a day was installed, but when the mine and plant reverted to the War Assets Administration all this equipment was sold.

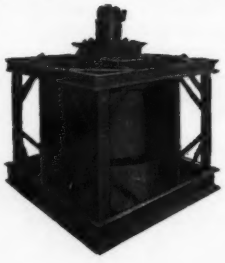
SuperDuty Holds Costs of Cleaning to Minimum

Production of high grade washed coal in the fine sizes is most profitable when the cleaning is done by SuperDuty Diagonal Deck Tables.

Removal of slate, pyrite and other impurities is exceptionally efficient . . . so much so that you have no more profitable process available.

The SuperDuty is used on either bituminous or anthracite coal. It is most efficient on sizes from ¾" down to 48 mesh and substantial cleaning is done at very fine meshes.

Capacity in any application will readily meet the economics of your job. For full information ask for Bulletin 119.



CONCENCO FEED DISTRIBUTOR

The Concenco Revolving Feed Distributor is a heavily fabricated all steel machine with motor drive requiring 1 H.P. or less in operation. It effectively provides a splitting of feed into any desired number of equal portions, to serve any number of circuits or machines in battery for greater overall efficiency. Unexcelled for feeding coal washing tables.

THE DEISTER★ CONCENTRATOR COMPANY

CONCENCO PRODUCTS

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Explore Northport District

Grandview mines has begun exploratory drilling in the Northport district of Stevens County, Wash. At the present time there are three diamond drills working, two of them in the area between the Anderson and the Admiral Consolidated mines, and a third on another prospect known as the Anderson prospect. Grandview is also doing a considerable amount of bulldozer stripping in the area as well as road building.

Mineral rights were obtained by the company on extensive areas of land in this district during the past two years. Now the company owns or controls the mineral rights of over 10,000 acres in the area.

Transfer Tungsten Holdings

Culp and Sommers, mining operators of John Day, Ore., have leased tungsten property developed by Knowles Bros. and Price Montrose on Tennessee Mountain in the Alder mining district east of Mountain City, Nev.

Much heavy equipment, including bulldozers, graders, compressors, etc., has been moved onto the property. Culp and Sommers intend to install a mill and expect to have it in operation by next summer.

New Mexico Miners to Meet

More than 1000 mining men and women are scheduled to meet in Albuquerque on November 6, 7 and 8 for the First Annual Southwest Mineral Conference.

The three-day joint convention, sponsored by the New Mexico Mining Association and the Southwest International Mining Association, which has been responsible for the annual International Mining Days Celebration at El Paso, is expected to attract national attention.

Gov. Edwin L. Mechem has recently proclaimed the week of November 2-8 Mining Week in New Mexico. The Governors of Arizona, Colorado, Texas and New Mexico are among those who have been invited as honored guests.

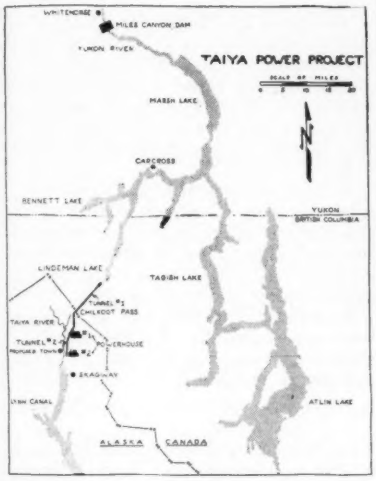
Principal speakers at the three-day meeting are to be: Howard I. Young, president, American Mining Congress; Ben D. Roberts, president, Southwest International Mining Association; James H. Boyd, vice-president in charge of exploration, Kennecott Copper Corp.; Robert S. Palmer, executive director, Colorado Mining Association: J. B. Knaebel, Anaconda Copper Mining Co.; J. W. Picking, chief engineer, Electronics and Control, Reliance Electric and Engineering Co.; Congressman Wilbur D. Mills; R. H. Jahns, Department of Geological Sciences, California Institute of Technology; and Paul Cain, of The Eldean-Cain Organization.

Alcoa Goes to Alaska

Aluminum Company of America (Alcoa) will undertake the construction of $400,000,000 aluminum smelting project in Alaska as soon as the necessary land can be purchased and government approvals obtained, the company recently reported.

Speaking at Mt. McKinley National Park, Leon E. Hickman, vice-president and general counsel for the company, outlined the details of a project which would initially be capable of producing 200,000 tons of aluminum annually.

The Alaskan smelting facilities, and electric power developments necessary to operate them, would be situated in the Taiya Valley district, near Skagway, Alaska. Financing of the project would be done entirely with private capital, Mr. Hickman said. He estimated that the Taiya development would require about four years for completion, and would offer employment for approximately 4000 people when full scale operations were under way.



Approximately 20,000 acres of land in the Taiya district will be needed to accommodate the proposed works and facilities, including a town site. It will probably be necessary for Congress to enact a law permitting the company to purchase the necessary land.

Hydroelectric power for the proposed Taiya project will be generated by damming the Yukon River at Miles Canyon, near Whitehorse. Generating capacity of adequate size would be installed there to supply the requirements of the Whitehorse community and the surrounding area, including part of the Yukon Territory.

Water from the reservoir thus formed would be carried under the Rocky Mountains through two tunnels having a combined length of approximately 21 miles, to two power houses in the Taiya Valley area.

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EASIEST WAY TO MAKE ENDS MEET

Sizes ¾" through 60"

The VICTAULIC METHOD is a *complete* line of Victaulic Couplings, Full-Flow Fittings and Vic-Groover Tools for mechanical piping construction. It's the easy way to hook-up pipe . . . it's fast and versatile . . . it's *complete and all-inclusive!* Use the VICTAULIC METHOD and you streamline piping . . . cut costs!

The Easy-to-use Victaulic Coupling . . . world-famous for quick, leak-proof connections . . . is the basic element of the VICTAULIC METHOD. For use with this coupling, Victaulic offers a complete line of top efficiency Full-Flow Elbows, Tees, Reducers and other Fittings . . . PLUS Vic-Groover Tools for preparing pipe ends easily and quickly right on the job!

Mis-alignments, expansion and contraction are automatically taken care of by Victaulic, locked-joint, leak-tight piping is assured. For new construction, repairs or alterations . . . for any piping job, big or small, the VICTAULIC METHOD *is the easiest way to make ends meet.*

The name VICTAULIC is more than a trademark . . . it stands for world leadership in a speedy, dependable piping method . . . backed by unexcelled engineering and years of proved experience. FOR YOUR OWN PROTECTION . . . be sure you get VICTAULIC!

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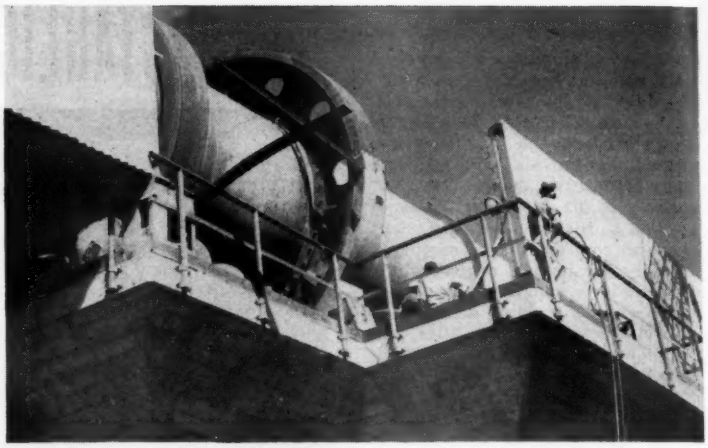

More Cement Coming

The new fourth kiln at the San Andreas, Calif., plant of Calaveras Cement Co. went into production early in September.

Its start marked the completion of an expansion and modernization program costing in excess of $2,500,000. It will increase plant capacity by approximately 50 percent.

H. C. "Pat" Maginn, executive vice-president and chairman of the management committee, expressed the hope that the additional production will help prevent future cement shortages such as those which occurred in northern California during 1950 and 1951.

Produced by Moore Dry Dock Co. under subcontract from Allis-Chalmers Manufacturing Co. of Milwaukee, Wis., the kiln is an exact duplicate of the company's third kiln which was installed at San Andreas in 1946. It is 360 ft long, with a diameter of 11 ft 3 in.

Related equipment installed with the kiln also has gone into operation at the Calaveras plant. This includes raw grinding mills, a $250,000 dust collector, a cooler, quarry equipment and blending and storage silos.

Installation of the new equipment was supervised by A. A. Hoffman, Calaveras vice-president and consulting engineer.

Close Winton Coal Mine

The Union Pacific Coal Co. closed the 38-year-old Winton mine during the past summer. At the same time it opened two new seams at the Reliance mine and Stansbury mine near Rock Springs, Wyo. The 150 miners who were employed at Winton were transferred to other company operations.

AEC Opens Another Station

The Atomic Energy Commission has announced it is establishing an ore-buying station and sampling plant at Greenriver, Utah. Chairman Gordon Dean announced that the purpose of the plant was to "stimulate production of uranium ores in a 6500-sq-mile area in the southeastern portion of the state." The plant, which will have a sampling capacity of approximately 200 tpd is to be located on a 115-acre tract in Elgin Townsite, Grand County, just east of the Greenriver. It is on the main line of the Denver & Rio Grande Western Railroad and is near the junction of highways 6-50 and state highway 24.

It will serve as a collection point for ores produced in an area bounded on the west by the San Rafael Swell, on the south by the Henry Mountains, and on the east by the Colorado River, and will include portions of Emery, Wayne, Garfield and Grand Counties. The Greenriver operation is expected to step up production of uranium-bearing ores by reducing transportation costs. Up to now the ores have been trucked to the AEC buying station at Monticello, an average distance of 150 miles or more.

Baltimore-Camas Active

Scheelite has been uncovered in the Shafer mine near Cherry Creek not far from Ely, Nev., according to G. P. Williams, president of Baltimore-Camas Mines, who operate the property. The vein varies in width from 18 in. to two ft, and has been exposed more than 20 ft. Baltimore-Camas has installed a tungsten concentration plant with a 100-tpd capacity at Lackawanna Springs. The plant will handle custom ore from properties in the Ely district and other Nevada districts besides treating scheelite from the company mines.

Uranium in Alaska

The U. S. Geological Survey has announced the discovery of a uranium deposit on the Seward peninsula in Alaska. The agency said initial investigations do not show the deposit to be commercially feasible, but that more intensive studies might prove otherwise.

Wheels of Government

(*Continued from page* 125)

inspector of coal mines, if he finds that the State has failed to comply substantially with any provisions of the agreement or if he believes that the State has failed to afford reasonable cooperation in administering the provisions of the Act.

Where Federal and State inspectors disagree as to issuance of an order, the Act provides that the operator, the State inspector or the Federal Bureau of Mines may apply to the Chief Judge of the United States District Court in which the mine is located for the appointment of a qualified and experienced independent inspector to make an inspection.

Director J. J. Forbes of the U. S. Bureau of Mines states that all coal mining States have been requested to submit State plans, and it is anticipated that a number of State plans will be forwarded shortly for USBM approval.

Mine Safety Review Board

The National Mine Safety Board of Review, created by the new Coal Mine Safety Act, held its first hearing October 17 on a U. S. Bureau of Mines "shutdown order" involving the Maxton Mine of the Morrisdale Coal Mining Co. in Clearfield County, Pa. Chairman of the Board is Alex U. Miller representing the public; other members are Joseph G. Solari for industry, and Charles R. Ferguson for labor.

The Maxton Mine had been considered non-gaseous, but a U. S. Bureau of Mines inspector found 0.44 percent of methane in one of the working faces (0.25 percent is the maximum permissible) and the mine was then classified as gassy under the new act. Richard M. Hess, manager of the property, asked the Board for the opportunity to prove that the mine is non-gaseous and stated that there is no gassy mine within 20 miles of his property. He stated that the Maxton Mine is due to hole into the company's No. 2 Mine (which is not classified as gassy) within a year and that under the present order the No. 2 would then have to be classified as gassy.

The Board has the case under advisement.

No Air Pollution . . .

when DUSTUBE® COLLECTORS are used in Coal Preparation

Dust is no longer discharged into the atmosphere and working conditions within the plant have been greatly improved since a Dustube Collector was installed by a prominent dry process coal preparation plant. The large Dustube unit handles 135,000 c.f.m of air from air separation tables and screens—and removes the dust at its source *before it permeates the atmosphere.*

UNIFORM RECOVERIES APPROACHING 100%

Process and ventilation air when discharged into the atmosphere contains no visible solids when filtered through a Dustube Collector.

OVERCOMES FIRE AND EXPLOSION HAZARDS

Air handling systems, properly designed by Wheelabrator engineers, remove explosive dusts and gases at their source thus practically eliminating explosion hazards within the plant.

HANDLES HOT AND/OR CORROSIVE GASES

A wide selection of filter fabrics has increased the scope of Dustube cloth filtration.

APPLICATION ENGINEERED

Dustube Collectors are individually designed for the rigorous dust and fume applications of the mining and metallurgical industry. Many of the coal industry's leading producers are using Dustubes to ventilate railroad and mine car dumpers, conveyor transfer points, elevators, screens, crushers, blending bins, car loaders and similar operations.

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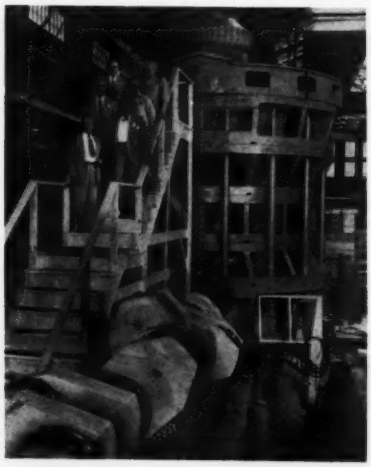
Ship Mammoth Crusher

The world's largest primary gyratory crusher, a massive steel structure standing approximately 27 ft high with a diameter close to 19 ft and weighing well over 1,000,000 lb, has been shipped from Nordberg Manu-



facturing Co. to Climax Molybdenum Co., Climax, Colo.

It took 12 railroad cars to ship this one crusher.

This "SYMONS" Primary Gyratory Crusher has a 60-in. feed opening. It will be used by Climax Molybdenum Co. for the primary crushing of molybdenum ore at that company's new Storke Level plant high in Colorado's Rocky Mountains.

Installation of the crusher, which stands as high as a three-story building, is part of Climax Molybdenum Co.'s expansion program to increase production of molybdenum. This program, requiring substantial capital additions, calls for a considerable increase in capacity of the Climax mill.

Improved Belt Conveyor

The Goodman Manufacturing Co. announces a specially designed belt conveyor that combines the strength and rigidity needed for shuttle car gathering with a "knockdown" type of construction that facilitates handling in space limitations imposed by low coal. Intermediate sections, which are joined to give desired conveyor length, knockdown into easily moved component parts, the longest of which is a 4-in. side channel, 8 ft long and weighing but 47 lb. Vertical flexibility of the conveyor line for following rolling bottom is provided by a pivoting action at each joining of intermediate sections. Also a feature is the Goodman pre-lubricated, renewable seal, precision idler bearing. The conveyor, known as the Type 98, is available for 30 and 36-in. belt widths with idler rollers of 2½ to 5-in. diameter. A descriptive catalog will be sent upon request to the company at Halsted Street and 48th Place, Chicago 9, Ill.

Allis-Chalmers Expands

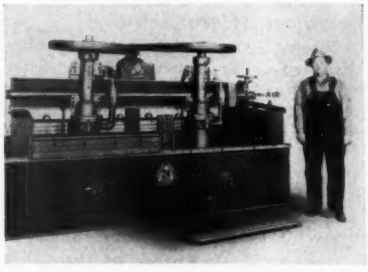
When this Model TS-300 was shipped from the Cedar Rapids, Iowa, works it officially marked the entrance of Allis-Chalmers in the motor scrap-

er field. The first shipment of equipment followed shortly after the acquisition of the LaPlant-Choate Manufacturing Co., Cedar Rapids. The large rubber-tired equipment is now incorporated in the A-C industrial line which includes diesel-powered crawler tractors, motor graders, industrial wheel tractors, and power units.

New Flotation Machine

Denver Equipment Co.'s new Super Rougher Flotation Machine is now in quantity production. This new machine, designed for roughing and scavenger flotation, features low level froth overflow on both sides of the machine; an open type of tank for pulp flow and super aeration. There are two impellers on each shaft. The many features of flotation flexibility incorporated into the new Denver "Sub-A" Super Rougher Flotation Machine give the Flotation Engineer the tools he needs to meet changing ore characteristics.

The 2-cell No. 24 Denver "Sub-A"



Super Rougher Flotation Machine shown here weighs approximately 4900 lb, and each two cells are powered by a 15 hp motor.

Bulletin No. F10-B69 describing the machine will be sent on request. Write the company at 1400 17th St., Denver 17, Colo.

Either Gas or Diesel Engines

Yale fork lift trucks in capacities from 4000 to 10,000 lb are available with either gas or diesel power plants, according to a recent announcement by James H. W. Conklin, general sales manager, The Yale & Towne Manufacturing Co., Philadelphia Division.

"A recently-concluded design standardization program now makes it possible to install either type power plant in the same size chassis," Conklin pointed out. "This permits wider flexibility in the application of fork lift trucks where operating conditions and available fuel indicate a definite preference for one type or the other," he concluded.

Revamp Coal Pier

The Virginian Railway Co. has ordered electrical equipment from the Westinghouse Electric Corp. to replace electrical operating units and controls at Pier No. 2 of its coal-handling facilities at Sewalls Point in Norfolk, Va. The equipment will be installed in the four mobile coal conveyor towers, two car dumpers, and haulages for both dumpers.

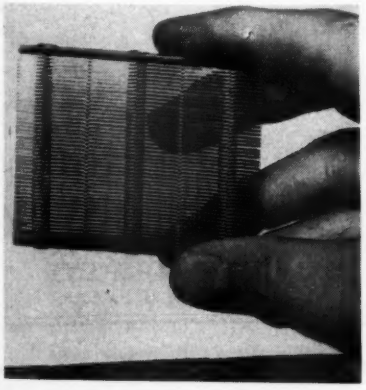
Pier No. 2, one of the highest-capacity coal piers on the Atlantic Seaboard, has berthing space to accommodate four ocean-going vessels at one time. Tidewater coal dumping facilities such as this are kept available for service 24 hours a day throughout the year.

Equipment called for in the order includes motors, controls, panels, and other apparatus. It is being manufactured at Westinghouse plants in Buffalo, N. Y., and East Pittsburgh, Pa.

Make New Screen

For processing fine materials, the Hendrick Manufacturing Co. of Carbondale, Pa., has developed a new Wedge-Slot Screen that has at least double the open area of any other type of dewatering screen, according to its makers.

It is made with stainless steel bars, much smaller than ever previously used in a screen. These have a V-shape profile that is most effective for



dewatering, drying, filtering, heavy media recovery, wet screening and centrifuging. The bars are of two types; Type 10A for openings ranging from 0.004 in. to 0.04 in.; Type 15A for openings from 0.012 in. to 0.06 in.

Slot spacings are uniform even with the smallest opening of 0.004 in. To prevent distortion of slot width in screening irregularly shaped material or from vibrating screen action, the spacing between rivets is only one in., instead of the 2¾-in. spacing commonly used. An additional safeguard against mesh distortion during use is provided by special spacing lugs between the profile bars, which lock the mesh.

With these new screens, it is said that dewatering performances are being obtained by screen action alone that hitherto were possible only by the use of expensive supplementary equipment.

A New Safety Goggle

A new plastic safety goggle trademarked SAF-I-FLEX has been developed and is now available. It is claimed by the manufacturer that through new design and using newly developed and improved materials that this safety goggle offers features of genuine comfort in wearing and extra strength and durability never available before.

A newly designed frame of pliable Vinyl has rolled edges where it contacts the face and new type grid ventilation which makes the goggle unusually comfortable and entirely fog free. The clear frame permits full side vision.

The new style lens can be easily and quickly changed. It locks securely into the frame channel at seven different points and is optically correct.

It is claimed that the SAF-I-FLEX offers full protection from all impact hazards and that it exceeds Federal Specifications for impact resistance and strength. It will fit over even the widest type personal glasses and because of its extreme light weight (1.7 oz) is very comfortable to wear. It is manufactured by the United States Safety Service Co., Kansas City 6, Mo.

— *Announcements* —

The winner of the contest conducted by **Crucible Steel Co. of America** at the recent Mining Show in Denver was **G. A. Heaton**, mine superintendent, U. S. Potash Co., Carlsbad, N. M. He won the L. C. Smith portable typewriter for estimating that the drill rod made from Crucible's CA Double Diamond alloy drill steel had drilled 1175 ft 6 in. The rod had actually drilled 1174 ft.

Frank J. Wolfe is back on the job after spending seven weeks in the hospital recuperating from an accident. He returned to the office of the **Coal Mine Equipment Sales Co.** in time to celebrate their 40th anniversary on September 4.

The Jeffrey Manufacturing Co., Columbus, Ohio, announces the following changes in its Home Office personnel: **C. W. Hawley**, formerly sales manager of the Products Engineering Division, has been named manager of Original Equipment Sales, Merchandise Division. Hawley just recently returned from six months with N. P. A. in Washington where he was Chief of the Conveyor Section.

Replacing Hawley as sales manager,

C. W. Hawley

L. L. Grooms

Products Engineering Division is **Lester L. Grooms**, who has had a varied career in engineering, sales and estimating since he first came with the company in September, 1916.

CATALOGS AND BULLETINS

IDEA BOOK. *Blackhawk Manufacturing Co., Milwaukee 1, Wis.* This 64-page book pictures a collection of new applications for this equipment in production, maintenance, construction, laboratory and other fields. Featured are tested uses for "Porto-Power" remotely-controlled hydraulic jack equipment and related products which introduce new ease, savings and safety to a great range of routine and special operations.

SAND DRYING STOVES. *Indiana Foundry Co., Indiana, Pa.* An eight-page bulletin which describes Sutton sand drying stoves, used on railroads, in mines, quarries and industrial plants. Discussed are the major features of each model of stove including its operation and capacity. A complete parts list is included.

ELECTRICAL COLLECTORS FOR COAL MINES. *Joy Manufacturing Co., Pittsburgh, Pa.* A two-color eight page bulletin, it provides ordering numbers on five different families of electrical connectors . . . gives pertinent information and application views on safety-circuit power distribution systems . . . lists five sizes of cable vulcanizers . . . describes electrically-operated track switch throwers and illustrates the latest designs in String-A-Lite, Joy's portable lighting assemblies. Those interested may obtain a free copy of bulletin B-39A by addressing a request on company stationery to Dept. P-4, c/o Advertising, Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

ROLLER CHAIN BOOK. *Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.* A comprehensive, 148-page roller chain engineering data book is now available. It includes detailed engineering information on the selection, installation, lubrication, and maintenance of roller chain for drives, conveyors, and sprocket wheels. Ask at the above address for book No. 2457.

DIAMOND BITS. *Sprague & Henwood, Inc., Scranton, Pa.* Bulletin No. 320 describes the diamond bits produced by Sprague & Henwood. Charts are included, which outline bit dimensions and describe the various types and kinds of matrixes used in the various bits. Copies of the bulletin can be had by writing the above company.

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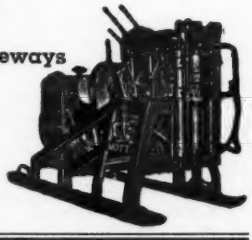

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Angular Slotted Bits Drill Longer in Hard Roof

An angular slotted recess in the cutting edge of Kennametal Roof Drill Bits is a new design feature that greatly increases bit life, particularly in hard roof. It also reduces bit "wander". Operators have reported as much as 30 per cent longer footage in laminated sandstone with bits of the new design.

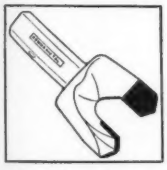
●

"First Aid" to Ailing Drill

Whenever you have trouble with drilling or cutting, "just call your Kennametal representative." He's an expert on these matters—and must be. He devotes all his time to them, and is a veteran coal mining man to boot. When one operator in Central West Virginia had a few armatures burn out, he called Jason C. McGuire, our local representative. After giving conditions the once-over, it was obvious that the bits were not being properly reconditioned. They were losing gage, and not allowing sufficient clearance for the auger. The problem was solved in a short time by giving the bit grinding man the proper instructions for the particular drilling conditions that were being encountered down at the face. It was a small, but important matter. But frequently little changes can make an appreciable difference in operating cost. Always depend on your local Kennametal representative for matters like this. He's glad to be of service.

●

Hexagonal Shank Bits for Drilling Holes for 2-5/16" Diameter Tubes



Kennametal Hexagonal Shanks in sizes of 1⅜" and 1⅛" provide strong bit construction for drilling larger diameter blast holes. They also enable the bits to withstand heavier pressure when they are being used on large drills for drilling hard impurities.

●

Jack W. Begley is New Kennametal Representative

Jack W. Begley has been recently appointed Kennametal sales representative for southern West Virginia, western Virginia, and eastern Tennessee. Mr. Begley has worked in and around coal mines since the age of 16 and he takes over this assignment 1½ years after being graduated in mining engineering from the University of Kentucky.

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- **SUPERIOR BIT DESIGN AND CONSTRUCTION**
- **EFFICIENT FIELD SERVICE**

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Kennametal Carbide, bit design, and field service are a proved combination of features, offered only by Kennametal, that assure lowest coal cutting cost, at highest efficiency.

Kennametal Carbide possesses greater uniformity of grain structure which gives it maximum resistance to impact and wear. Evidence of this fact is that 95 per cent of the cutting and drilling in hard potash ore deposits is done with Kennametal. This is as severe a test of the stamina of a bit as exists. The design and construction of the Kennametal Bit itself is no less important. The bit body is a special alloy steel that is heat-treated and hardened to the extent that it has the highest strength obtainable in a 1"x ½" steel section. A shoulder on the bit gives the cutting edge extra support, and prevents the bit from freezing in the block. In addition, Kennametal Bits are offered in more than 30 different types of cutting edge construction. This affords opportunity to have a design best suited to your needs—cost, job, equipment considered.

These outstanding features of Kennametal are supplemented by competent Kennametal field representatives, veteran coal mining men, who are always available for demonstration or for service on any trouble that may develop. They give you the best, and they know carbide bits — inside out. Kennametal Inc., Latrobe, Pa.

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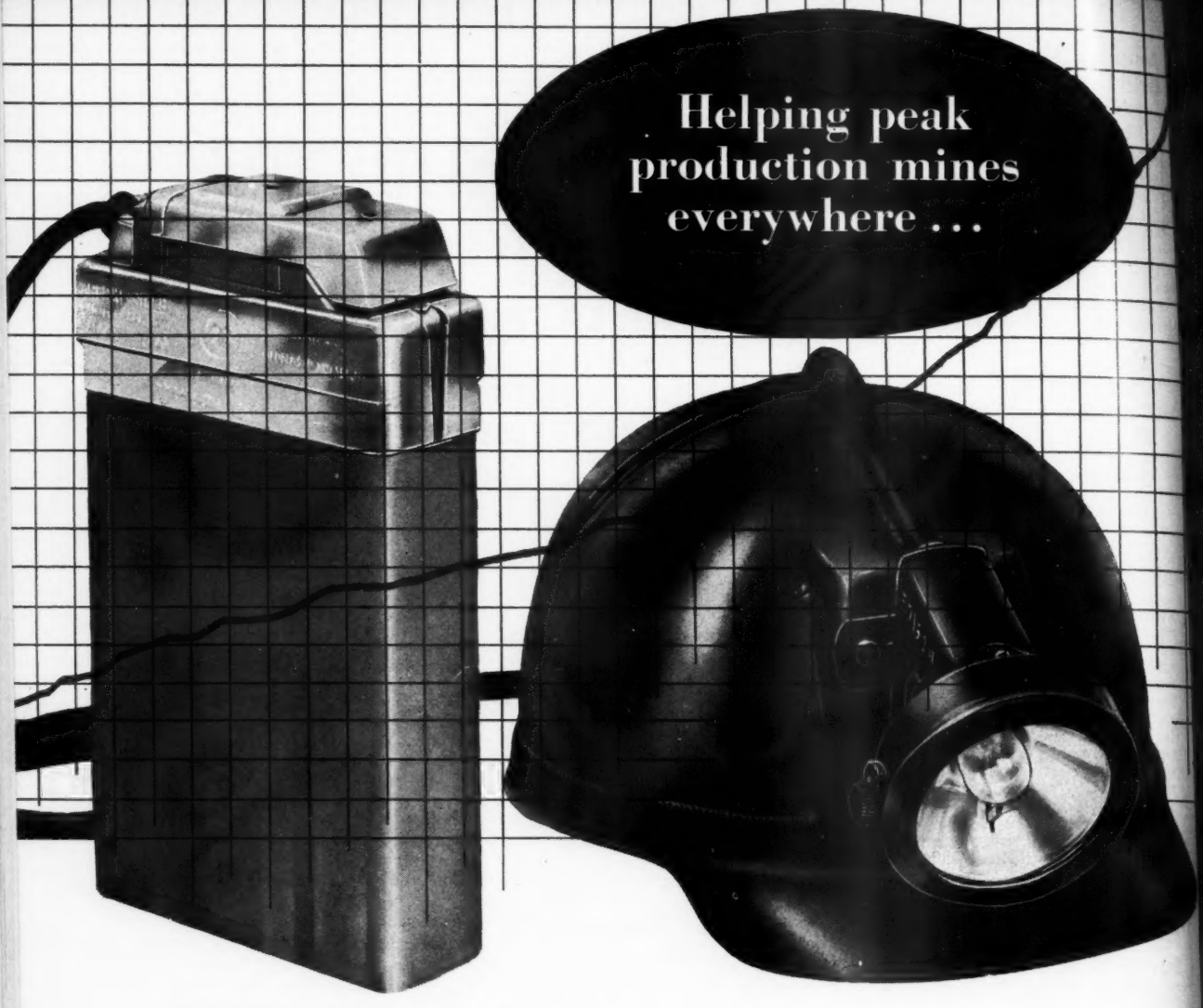

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